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'Young Woman': only one of many facets of Rodin's art (p. 36)

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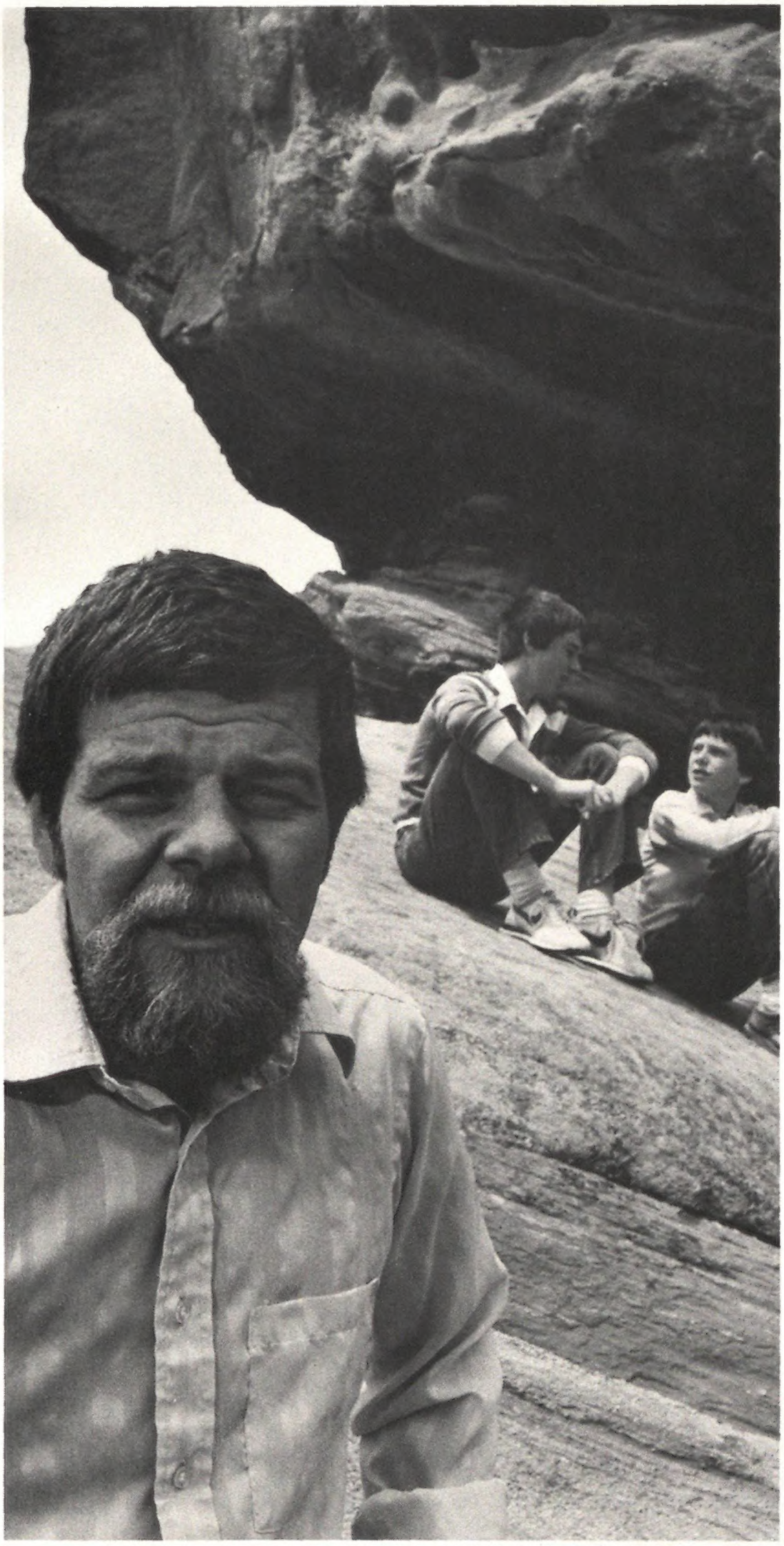

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Smithsonian (ISSN 0037-7333) is published monthly by the Smithsonian Associates, 900 Jefferson Drive, Washington, D.C. 20560.
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Subscription price $14 a year in U.S. and possessions, $22 elsewhere. Single copy price $1.25. Second-class postage paid at Washington, D.C.
Editorial offices, 900 Jefferson Drive, Washington, D.C. 20560.
Advertising and circulation offices at 420 Lexington Ave., New York, New York 10170.
Members: Please address all subscription correspondence and change of address information to P.O. Box 2955, Boulder, CO 80322
Postmaster: send 3579s to P.O. Box 2955, Boulder, CO 80302

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Smithsonian

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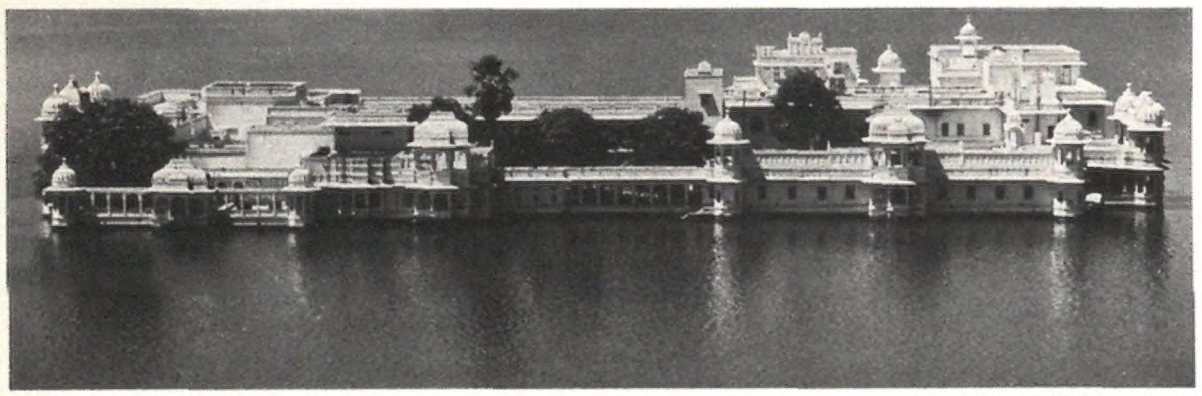

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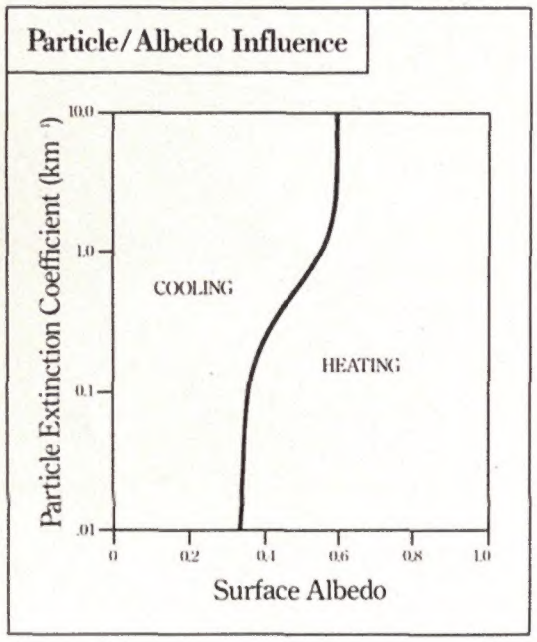
The Albedo Effect

The Albedo Effect

Mathematical models of the atmosphere are the chief scientific tools for predicting long-term climate and identifying possible climatic changes that may result from man's activities. Recent advances at the General Motors Research Laboratories have revealed new information about the contribution of airborne particles to the delicate thermal balance of the earth's atmosphere.



Regions of heating and cooling determined by particle characteristics and surface albedo.

Radiation scattering exhibited by a layer of particles. The inset shows the distribution of scattering by a single particle of mean size.

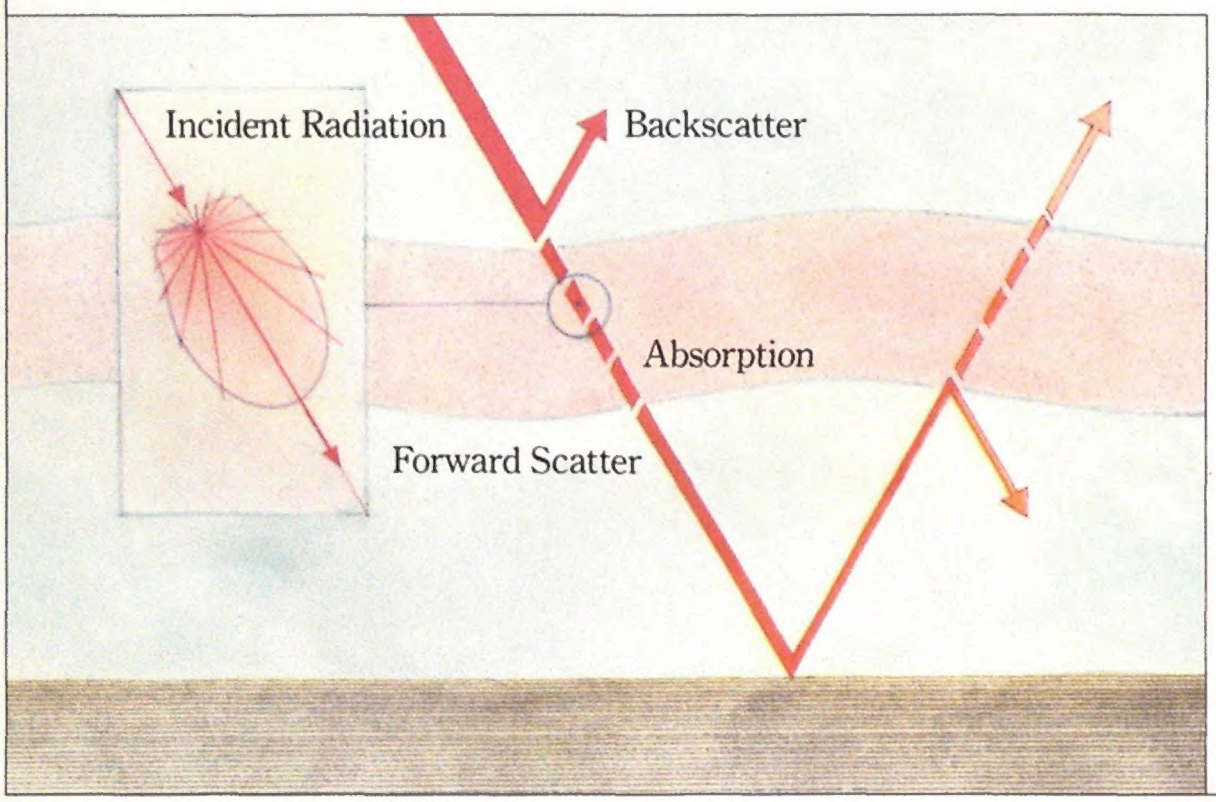
DEVOID of its atmosphere, the bare earth would reach an average temperature of only −1°C. Atmospheric interaction with solar and terrestrial radiation raises the average surface temperature to fifteen degrees Celsius, making life as we know it possible. Small fluctuations in overall temperature can have large-scale effects. It is believed that a drop of a few degrees Celsius lasting for a period as short as four years could trigger an ice age. Fundamental studies conducted at the General Motors Research Laboratories explore the effect of various atmospheric factors, natural and man-made, on the earth's thermal balance.

New knowledge of the influence of airborne particles on the earth's thermal balance has been revealed by investigations carried out by Dr. Ruth Reck. Dr. Reck's work at General Motors integrated for the first time the complex factor of particles into radiative-convective atmospheric models. Her findings help determine under what conditions particles have a cooling influence, and under what conditions they have a heating influence.

Airborne particles have many sources: volcanic issue, wind-raised dust and sea salt, ash, soot, direct and indirect products of combustion and industrial processing, the products of the decay of plant and animal life, the liquid droplets and ice crystals that make up clouds. Particles alter the radiation flow in the atmosphere by the processes of scattering and absorption. Particles differ by size and composition, factors which determine optical properties.

Prior to Dr. Reck's work, models for calculating the vertical temperature profile included layers of clouds and the significant gases—O_2, O_3, H_2O and CO_2—but neglected the particle factor. To establish the thermal effect of particles, later models assumed a uniform vertical temperature change.

Dr. Reck's contribution was to add the particle factor to a one-dimensional model developed at the Geophysical Fluid Dynamics Laboratory at Princeton University. This model divides the atmosphere into nine layers. An initial temperature distribution is assumed, and the model is used to compute the net radiative energy



flow into or out of each layer. A particle population is input for each layer. Calculated radiation imbalances result in a temperature change for each layer within the model, subject to the condition that change in temperature with altitude not exceed the adiabatic lapse rate. The new temperatures are used to compute a new radiation balance. This process is repeated until there are no further changes in temperature.

The particles of interest, known as Mie-scattering aerosols, are comparable in size to the wavelength of the incident radiation. Dr. Reck models the interaction of these particles with the radiation field in terms of two parameters: the single scattering albedo of the particle, which describes backscatter, and an anisotropic scattering factor, which measures the degree of forward scatter. From these two quantities and the size distribution and abundance of the particles, the transmission, absorption and backscatter of each layer in the model can be calculated.

DR. RECK discovered that whether particles have a heating or cooling influence depends upon the surface albedo, or reflective power, of the earth directly beneath them. Snow (0.6) is more reflective than sand (0.3); water is less reflective than either (0.07). Her results indicate that when surface albedo is small, the net effect of particles is to "shield" the earth from incoming solar radiation, producing a cooling influence. When surface albedo is large, a trapping effect prevails, in which the portion of solar radiation that reaches the earth's surface is "trapped" between the surface and the particles, producing a net heating influence. The competition between these two effects, shielding and trapping, determines the overall thermal influence of particles.

Dr. Reck calculated that for the latitudes between the equator and 35°N, where average surface albedo is low, the current background level of atmospheric particles decreases solar radiation reaching the earth by ~1%, thus producing a net cooling effect. Her findings indicate that heating takes place at latitudes north of 55°N, where average surface albedo is high. Calculations with the model indicate a correlation between the increase in particle abundance due to volcanic activity in 1970 and a subsequent ice build-up in 1971.

"Previous models did not adequately take into account the role played by particles in the earth's thermal balance," says Dr. Reck. "The geosystem is continually changing. It is important for us to understand the elements that affect this evolution, so that we may know how man's activities influence the atmosphere."

THE WOMAN BEHIND THE WORK

Dr. Ruth Reck is a Staff Research Scientist in the Physics Department at the General Motors Research Laboratories.

Dr. Reck received her Ph.D in physical chemistry from the University of Minnesota. Her thesis, on the statistical mechanics of heterogeneous systems, concerned the theory of diffusion-controlled chemical reactions. Prior to joining General Motors in 1965, she was a Research Associate in the Applied Mathematics Department of Brown University.

In addition to global climate studies, Dr. Reck has done research at General Motors in solid state physics and magnetic materials. Over the last seven years, she has participated in several international exchange programs on climate-related subjects.

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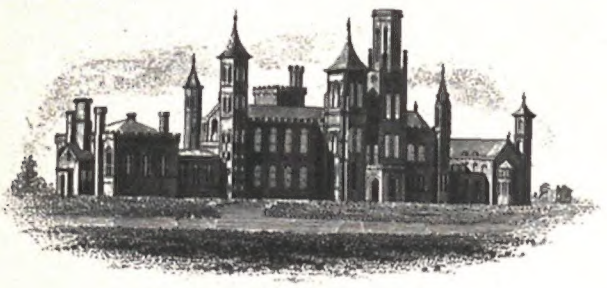
Secretary Ripley's comments

The view from the castle



Looking ahead to the 200th anniversary in October of the Battle of Yorktown, we may ask if we have learned its lessons

Twelve years ago the Smithsonian began planning the celebration of the Bicentennial of the Revolution. Our purposes were plain: to attempt by all means to remind Americans of the events in our history that had created the nation. In this work the Institution had a tradition. The second Secretary, Spencer Fullerton Baird, as Assistant Secretary, had had a notable influence in the development of exhibits for the Centennial Exposition in Philadelphia in 1876.

Each year since the late 1960s we have developed programs of exhibits, displays, lectures or cooperative projects, such as our Folklife Festivals, to underscore the events of those formative times. The year 1976 may have been the climax, with the opening of the National Air and Space Museum, one of the current wonders of the world in art and design and technological history. But we plan to continue to observe and celebrate the events of those years down to 1987, the Bicentennial of the Constitution.

Now in July 1981 we must celebrate not only the anniversary of our independence, but also look forward to the 200th anniversary of the culminating battle of the Revolution, the engagement at Yorktown.

On October 19, 1781, General Cornwallis surrendered to the combined French and American forces, effectively united on land and sea for the first time. This was the climactic military engagement of the war, foreseen in its strategic entirety perhaps only by General Washington. He had finally secured the help he had envisioned in his appeals to France through Benjamin Franklin and John Laurens—support from the troops of Rochambeau in the north, the fleet of de Barras, and the great fleet of de Grasse sent up from the West Indies.

And so all of these forces coalesced against the ill-advised and indecisive Cornwallis, holed up in Yorktown, far away from the wavering orders of General Clinton in New York and the fine naval strength of the British Admiral Hood.

Happening so, and with decisive and critical bravery in assault on the British redoubts by American and French troops alike (Alexander Hamilton distinguished himself here), the British were overwhelmed, surrendered, and the main event was all but over.

What were the lessons of Yorktown? The war was no sooner won and the Treaty of Ghent signed in 1783, than we almost lost the peace. It seems to be an enduring fact of history that political dissension flourishes in peacetime, and that the battles won in war are often demeaned or undercut by the preoccupations of peace. Washington himself found this true, commenting that "internal dissensions" threatened the new Republic, and "the fairest prospect of happiness and prosperity that ever was presented to man, will be lost."

In these topsy-turvy years, it is well to remember the ebb and flow of our belief in political verities, and to celebrate October 19, 1981, with our allies, as Senator John Warner's Joint Resolution to Congress (June 17, 1980) would have it: ". . . it is fitting that this historic event be commemorated in such a manner as to rekindle love of country and devotion to its principles by recalling to this generation the trials and triumphs of the past."

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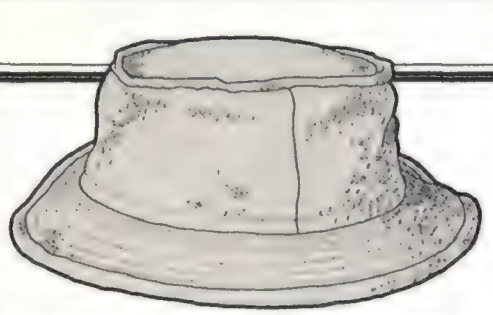

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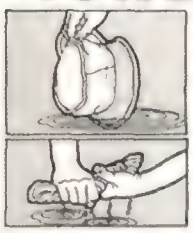

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Letters to the Editor

Dumbarton Oaks

Dear Sir: Michael Olmert's fine article on Dumbarton Oaks in your May issue clearly shows the interest in beauty and scholarship firmly established there by Mildred and Robert Woods Bliss. However, music, quite central to their lives, was mentioned only obliquely.

During the Thirties, as violist of the Musical Art String Quartet, it was my privilege to perform at the Bliss home several times each season. In addition to fulfilling their musical needs, this was an indirect way of supporting chamber music at a time when such music was not so widely accepted.

In 1935 Mrs. Bliss purchased the Gibson Stradivarius viola and lent it to me. I used it while a member of the quartet, and when I resigned I returned it to her, whereupon she offered it to my successor. Such good deeds on the part of the Blisses were done without publicity or fanfare.

Those of us who benefited from their enthusiasm and support will remember them with deep respect and appreciation.
Louis Kievman
Pacific Palisades, California

Buffalo

Dear Sir: I particularly enjoyed John G. Mitchell's article on the rescue of the buffalo from almost certain extinction.

I was slightly disappointed, however, not to see any mention of the herd located in the Tanana River Valley in Alaska. When I was there in the mid-1940s, the herd numbered several hundred and was increasing annually. According to local citizens, the original herd of 20 buffalo from Montana was sent to Alaska during the late 1920s by the Department of the Interior. They were released in the vicinity of Big Delta, but ranged from the river valley to the northern slopes of the Rockies, depending on the season. The air base at Big Delta was probably the only one in the world with a permanent notice warning incoming pilots to be alert for possible buffalo on the runway.
Robert F. Myers
Panama City, Florida

Dear Sir: Contrary to the statement in your article, Beefalo are indeed fertile and have the ability to reproduce. Although a cross between two species and therefore a hybrid animal (⅜ bison and ⅝ domestic bovine), our Beefalo have shown a high conception rate using artificial insemination over the past six years, and pasture breeding is used throughout the world. Calving ease is an important attribute, with calves averaging 40 to 60 pounds birth weight—a significant reason for very few calving problems, with seldom a need for calving assistance, one of many of their bison traits. After birth they grow rapidly, averaging three to four and one-half pounds a day.
George E. O'Connor, Executive Director
American Beefalo Association, Inc.
Louisville, Kentucky
The United States Department of Agriculture has had many inquiries over the years about the breeding and qualities of Beefalo. All the Department's scientific research has been done with domestic breeds of cattle and their priorities have not involved research on either Beefalo or bison. Therefore, they do not have information to back up or refute the reproductive capacity or other qualities of the bovine/bison crosses. Ed.

Lord Monboddo

Dear Sir: In his excellent article on the unjustly neglected Lord Monboddo, Israel Shenker might have mentioned that the noble Lord's belief in the sagacity and virtue of the orangutan was neatly, though sympathetically, satirized by Thomas Love Peacock, the equally unjustly neglected novelist. In his *Melincourt* (1817), Peacock has a character named Sir Oran Haut-ton, who is in fact an amiable and beautifully mannered—though, of course, dumb—ape. Sir Oran plays the flute with skill and feeling,

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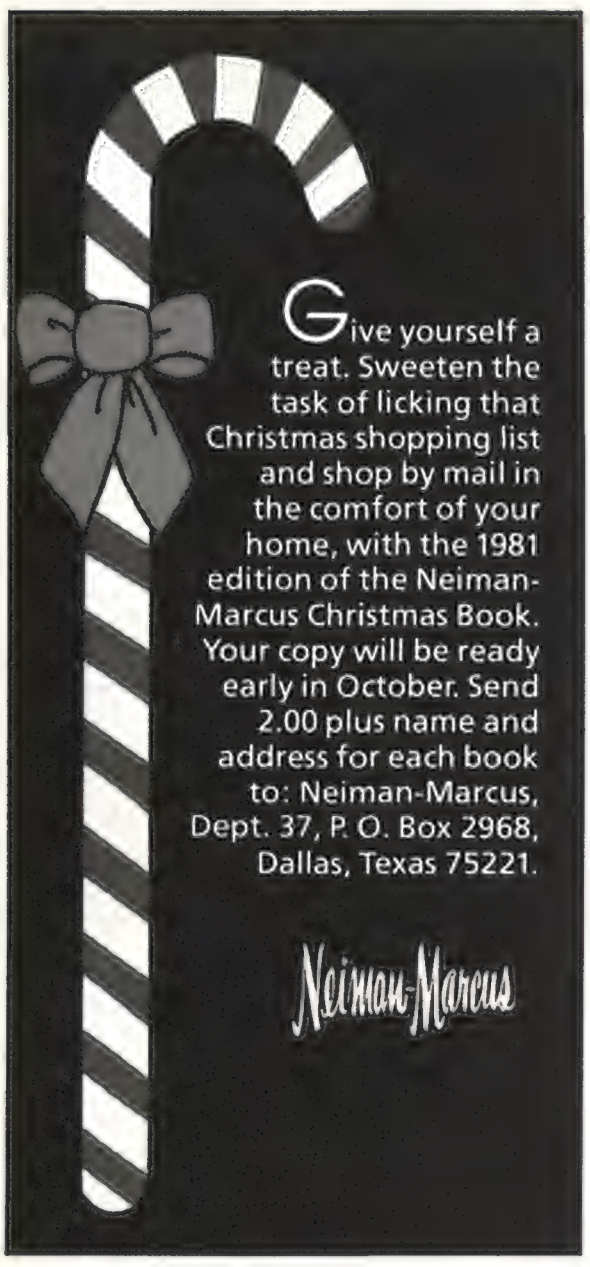
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twice rescues the fair maiden who is the novel's heroine, and, without uttering a word, is elected Member of Parliament.
George E. Wellwarth
State University of New York
Binghamton, New York

Dear Sir: Whether by intent or not, Brenda Losey's illustration of Lord Monboddo [see below] bears a startling resemblance, wig and all, to the late Bert Lahr as the Cowardly Lion in *The Wizard of Oz.*
Alfred Stern
New York City

Stuttering

Dear Sir: In Michael Kernan's article on stuttering, Philip Glasner's statements seem to take particular aim at undermining the credibility of speech pathologists. His attack is potentially dangerous to the very important trust between patients and their clinicians who are working very hard (and quite successfully, I might add) in treating the problem of stuttering.

As a speech pathologist who has worked in a wide variety of professional settings I feel that it is inaccurate to say that we "almost never see a preschool stutterer." There are many speech pathologists who do not work in the school system. They are making a conscious effort to get physicians, teachers and health professionals to help us identify and treat children from birth to the age of three years, the critical years for language/communication development.

I must also come to the defense of those often overworked speech therapists who are dedicated and determined to face impossible odds by working in the public school setting. Many times they are still forced to serve several schools at a time with case loads of 50 to 100 students, while being assigned working spaces such as an auditorium, hallway or storage closet. These therapists have access to all the children, not just those whose parents are motivated and can afford a private therapist or doctor.

I feel strongly that professionals need to learn to utilize each other more effectively. Let's not try to discredit each other, but appreciate each specialist's unique combination of talent, training and major emphasis, so that more people can be effectively reached and served.
Pamela Chappell
Greensboro, North Carolina

Dear Sir: You appear to have accomplished what centuries of study by various professions have failed to do. You have determined the cause and appropriate treatment of stuttering. But how tragic it would be if, in building a folk hero, any individual who stutters were to be seduced into accepting one clinician's evaluation of his own work.
Russell L. Malone, Executive Director
National Association for Hearing and Speech Action
Rockville, Maryland

Dear Sir: As a speech pathologist, I have been trained in the use of several treatment strategies that were mentioned briefly in the article and that differ from Philip Glasner's methods. However, I agree that the psychological component in stuttering is often overlooked.
Denise Da Pra
Boca Raton, Florida

Morris dancers

Dear Sir: David Schwartz's splendid article on Morris dancers has taken an 89-year-old English folk dancer back some 65 years to the early days of these dances in America. As Mr. Schwartz mentioned, the revival of interest in these dances was primarily due to the efforts of Cecil Sharp.

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In the English countryside "C#" found a gold mine of country dances, which he patiently collected, wresting the patterns and tunes from folk the country round. He extended his research abroad and found treasures in America, particularly in the Pine Mountain area in Kentucky and in the Appalachian region of the mid-Atlantic states.

In the 1920s, May Gadd (later shortened to "Gay"), a young teacher from Sharp's London-based English Folk Dance Society, came "to introduce English folk dancing to the Americans." She found that the idea immediately took hold in New York and other cities, and a branch of the Society (now The Country Dance & Song Society) was formed. Gay became the national director, and her inspired leadership gave the new activity an assured place in American dance.

Onida R. Meyer
Round Top, New York

Beep-beep-beep...the world over

Dear Sir: Richard Wolkomir's article about the behavior of drivers around the world made me wonder if anyone has ever studied the psychology of the driver. It is amazing how the personality can change as soon as one gets behind the wheel. Those who have a tendency to conceal and suppress all their frustrations at the office find that they have a satisfactory way of releasing them once they get on the road. Every rush hour is the Indy 500.

I'm not saying this as only an observer; I'm out there myself every evening, shifting menacingly between first and second gear. I have created a "best driver" contest which I have every evening. As I get on the highway, I select my opponent—usually an antsy driver who isn't satisfied with whatever lane he is in, or one who sniffs haughtily as his gas guzzler engulfs me in shadow as he rolls past—and "race" him to my exit. My technique is to relax, tolerate the tedium of the slow drive and listen to music to keep the blood pressure down. By driving smoothly along in one lane, changing only when deemed most advantageous, calculating the flow of traffic and utilizing past experience, I usually cross the finish line way ahead of that turkey. It gives me a feeling of calm confidence in my superior intellect and effortless driving expertise.

Leslie Watson
Alexandria, Virginia

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LTV. Looking Ahead

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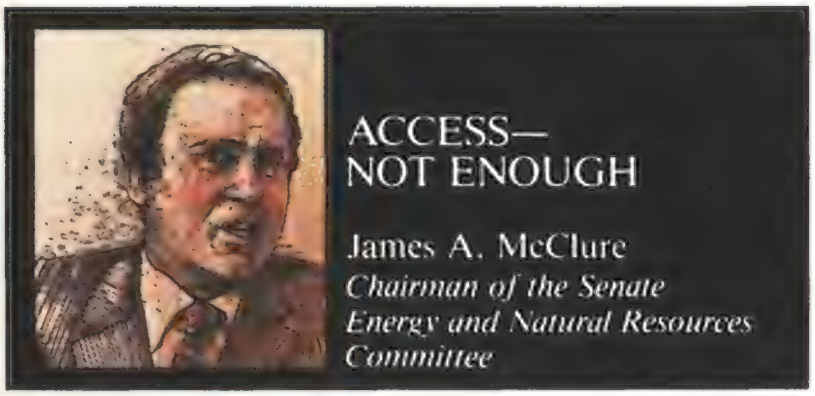


ACCESS— NOT ENOUGH

James A. McClure
Chairman of the Senate Energy and Natural Resources Committee

The U.S. faces large gaps between consumption of oil & gas and our ability to produce it. We remain dependent on OPEC—hostage, if you will.

The use of Federal lands for energy exploration and development must be an important consideration.

To put it another way—a refusal to use our vast Federal land resources will prove to be very costly to America. Costly in worldwide political terms, costly in terms of our ability to compete industrially, costly to each citizen at the gasoline pump.

The "Mineral Crisis?"

Equally important is the role of the Federal lands in providing the resource base for exploration and development of strategic minerals. We are racing headlong toward a minerals crisis which will be just as severe as the energy crisis.

Public lands management is a management of trade-offs—conflicting issues of development, conservation, environmental protection. But, the so-called trade-offs of the past are no longer sufficient. I believe that greater opportunities exist nationwide for intensified exploration and production of oil,gas, and strategic minerals from Federal lands.

The Federal government controls about 410 million acres in the lower 48 states. Of this, approximately 64 million acres have been closed to oil and gas leasing. Some of this land has been withdrawn from development by proper Congressional action—national parks, wilderness areas, etc. But, a vast amount of public land is being withdrawn by executive or administrative actions. It is that executive and administrative action that demands closer attention.

Paralysis by analysis

Although legal access to Federal lands in certain classifications may be apparent, practical access is prevented by requirements for inventory, environmental assessments, and lawsuits entered into by advocacy groups. *The result—delay.* Not simply a matter of months or even years, but decades of delay in reaching a final land-use decision. Interior Secretary James Watt identified it as "paralysis by analysis."

Let's consider one last problem, "economic access." If we are able to make a legal decision on public land use, often the stipulations under which access is permitted are not economically justifiable. To the entrepreneur seeking to explore for oil, or mine cobalt, the economics force him to look elsewhere, possibly overseas. Again, America loses a little self-dependence.

I intend to fully explore the subject of access to Federal lands and hopefully to separate fact from fiction. Land-use processes must be believable and understandable. We must use, not abuse the public lands. But any conservation ethic demands that we make wise use of those resources available to us.

ACCESS— ENOUGH FOR NOW

Morris K. Udall
Chairman of the House Interior Committee

We must sort out the inescapable questions. What kind of access? Where? By whom? For what? Under what circumstances?

Congress, over the past 20 years, has made many changes in land management laws that have been difficult to accept for those accustomed to easy access.

Without these changes, we would be facing a legacy of shortsighted public land management that would exhaust our resources now without regard for the future.

Only by addressing the questions above can we guarantee the long-term productivity of the land.

In trying to correct imbalances of past land management practices, some argue, the Federal government has gone "too far." But have we? Consider these facts:

In the 11 Western states, less than 13.5 percent of the national forests are designated wilderness. Less than 16 percent of Bureau of Land Management acreage is even under consideration for future wilderness designation. Yet a national crusade—joined, I am sorry to say, by the new Interior Secretary—seeks to open up wilderness, ignoring the fact that there are far greater resources on the remaining 80 to 85 percent of the lands that already are managed to permit reasonable development.

"Environmental extremism?"

The GAO estimates that 45 percent of all the Federal onshore lands favorable for oil and gas are under lease right now. This is a sizable 31 percent increase since 1976. But, historically, more than 70 percent of all leases never see a drill or even a drilling plan before the lease expires, primarily

because leases are notorious for attracting speculators. But instead of demanding diligent development of lands already under lease, industry complains about an orgy of "environmental extremism."

A movement that, at the outside, will restrict less than 20 percent of all the public lands from development for the sake of conservation is not, in my opinion, extreme.

Nor do I think it extreme that Congress now requires strip-mined land to be reclaimed and the best and least sensitive energy lands to be leased first. It is not extreme that Congress now requires sensible planning systems to be adhered to by Federal land managers or the carrying capacity of the land to be respected or multiple use to mean not simple economic exploitation, but *use that leaves the land useful* for other purposes. It is not extreme to require that some land just be left alone.

All of these policies, and others, restrict "access." They also guarantee that recreationists, ranchers, farmers, wildlife biologists, historians and scientists as well as mining, timber and oil companies will have their share of "access" to healthy land now and for many generations to come.

March 1981 poll indicates growing support for wilderness access. But the public cautions, "Look before we leap."

"How do you feel about changing the use of wilderness areas so that roads could be built and the natural resources, such as timber, gas, oil, and other minerals, could be developed, as long as developers covered up all signs of use afterward?" That was one question.

Of the 1,008 people contacted by phone throughout the United States in March 1981 by Opinion Research Corporation, the majority were in favor of more access: 57 percent vs. 39 percent with 4 percent having no opinion. The study was conducted for LTV.

(The complete research report is in the current "Looking Ahead" mailing. See Mr. Thayer's column for information.)

The first question had to do with changing *current use* of already designated wilderness areas. The next question had to do with *future* wilderness areas. "Actions are being considered by the Federal government to set aside *more* Federal public lands as wilderness areas to be preserved and protected. Some people believe that there should be a thorough study to determine the amount of natural resources present in these additional lands *before* setting them aside..."

Interviewers then named basic resources (energy sources, minerals, etc.) that might be available in these potential wilderness areas, and asked if the respondent would favor or oppose a study to determine how much of that particular resource was present.

The idea of "putting the toe in the water"—so to speak—to find out if an energy resource was available was greeted with an overhelmingly favorable response: 83 percent of the respondents indicated they would be in favor of "finding out."

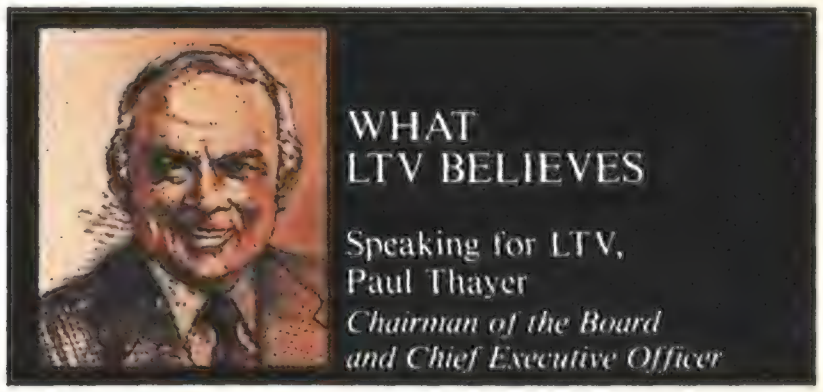
When the question was presented as to whether or not the respondent would favor actual development once the energy resource was found to be present, the favorable percentage dropped nine points to 74 percent.

The number of people in favor of developing minerals and timber resources was 57 percent. A clear majority, but not nearly as emphatic a majority as the one inspired by the energy question.

The overall percentage of people in favor of development has increased since a similar ORC poll in 1978. Specifically: energy up 10 percent to the aforementioned 74 percent; minerals up 11 percent to 57 percent; and timber up 5 percent to 57 percent.

Change in West

The West recorded the only statistically significant change in opinion relative to developing resources on current wilderness reserves. Only 41 percent were in favor of development in 1978—now 57 percent of the Westerners polled are in favor—providing developers cover up signs of use.



Continental Emsco, an LTV subsidiary, is in energy. We encourage open discussion of the access issue by responsible leaders—and hope for a speedy resolution.

I want to thank Senator McClure and Congressman Udall for participating in this forum. They are two dedicated public servants with the courage to speak their convictions. "Who won this debate?" The answer, clearly, is *you*, the reader. You have more information—including an independent public opinion poll—with which to shape your own opinion.

The issue of access is important to us because of our involvement in the energy business. The sooner the issue is resolved—the better we can plan and manage our business. The closer we come to being self-sufficient, the better off we are as a nation, and less likely to be at the mercy of energy surplus nations.

LTV's energy group

This is an opportune time to report that Continental Emsco had an exceptional year. Sales in 1980 climbed well past the $1 billion mark, an increase of 52 percent over 1979.

The worldwide effort to expand hydrocarbon supplies created strong demand for the broad line of drilling machinery, production equipment, tubular goods and oilfield supplies manufactured and distributed by Continental Emsco. During 1980 also, C-E opened four new oilfield supplies stores, bringing the total number to 113 in the U.S. and Canada. Acquisitions included the Skagit Corporation in Washington state. Skagit's product line complements C-E's existing line of offshore products. It also had underutilized manufacturing capacity, which C-E was able to immediately begin using to expand production of drilling equipment.

The outlook for the future is excellent. Recent acquisitions such as Skagit—plus an aggressive capital spending program—are solving the past capacity-restraint problem. This should solidify the LTV energy group's position as a major participant in the effort to meet the nation's energy needs.

More information available

Last year, LTV's *Looking Ahead* communications program presented experts' views of the future of the five industries in which the corporation is active. This year the program will deal with the *issues* critical to those industries. If you would like to be on our mailing list, please write me, Paul Thayer, LTV Corporation, LOOKING AHEAD MAILING, P.O. Box 225003-1F, Dallas, TX 75265.

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Around the Mall and beyond

They cleaned me up and allowed me to stand in a cold rain outside the National Air and Space Museum, one day in early spring, so that I could keep an eye on Prince Charles. He was visiting Washington and wanted to have a look at the museum because he flies and likes planes.

This was one of those occasions that has to be meticulously reported, so I filed a very careful summary of the events of the day, heavily laden with facts and figures. Here it is:

Rain in early spring has a mean temperature of 34 degrees F, or about one Celsius. Wind velocity averages 35 knots. It takes 12 minutes for spring rain to get inside the collar of a raincoat, another three minutes to work its way down to the lumbar region, and four minutes 30 seconds to soak straight through raincoat, jacket and shirt. Wind at 35 knots will blow an umbrella inside out in 54 seconds of the first round.

Journalists, under these atmospheric conditions, snarl a lot. But Secret Service men have learned to shiver in absolute silence. Not a tooth chatters.

Police cars, driving up fast to a museum door through a puddle of spring rain, can spray journalists effectively at a range of 43 feet. It takes four hours and 23 minutes for khaki pants to dry out after being so sprayed. Hot whiskey and lemon is nice. It doesn't cure a cold.

Dignitaries who meet Princes of Wales in a spring rain carry large, dry umbrellas. Onlookers who line fences do not cheer as loudly when they are wet as when they are dry. When they clap their hands it sounds like circus sea lions who have just finished playing *Yankee Doodle* on a set of horns.

Princes of Wales wave and smile to onlookers and shake hands with dignitaries. They eschew umbrellas. They seem sort of used to rainy weather. They are nicely dressed with white handkerchiefs in their breast pockets. They look very healthy. After Princes of Wales have entered a museum, in a cold spring rain, dignitaries crowd through after them, eight abreast, and jam each other into the door frame.

When people ask, How was the Prince of Wales, the answer is, Fine.

Paul Garber, historian emeritus of the museum Prince Charles visited, called me to ask if I knew how old Charles is. I didn't, offhand. "Well I do," said Mr. Garber, and proceeded to tell me how it was that he had this piece of information well in hand.

On another cold, bleak day in Halifax, Nova Scotia, Mr. Garber was waiting for a ship to come and get the Wright plane that flew at Kitty Hawk and today hangs in the central gallery of the museum. The plane had been on loan for 20 years to the Science Museum in London. Now it was scheduled for return aboard the *Mauretania*, docking in New York, but a waterfront strike changed the plans. The ship diverted to Halifax, where Mr. Garber received the three crates containing the plane. But he had no way of getting them to the United States, until he thought of calling the Navy Department in Washington. He was told that the USS *Palau* was off Argentia, Newfoundland, on maneuvers and that it would pick him up but they weren't sure when.

Every day, Mr. Garber watched for the vessel to heave in sight. At last he saw the right ship entering the harbor. And no sooner did it appear than shore installations thundered out a multigun salute, one boom at a time.

How friendly these Nova Scotians are, thought Mr. Garber. A salute for a Yankee ship! Suffused with good feeling, he expressed his pleasure to a passing sailor, a Londoner, judging by his speech.

"Mitey," said the tar, "the guns eyen't for your ship. Our Princess 'as just 'ad a bybie!"

Mr. Garber remembers that the date of "arrival" of both the Wright plane and Prince Charles was November 14, 1948.

My friends at the Insect Zoo in the Museum of Natural History were intrigued by a recent letter referring to the fact

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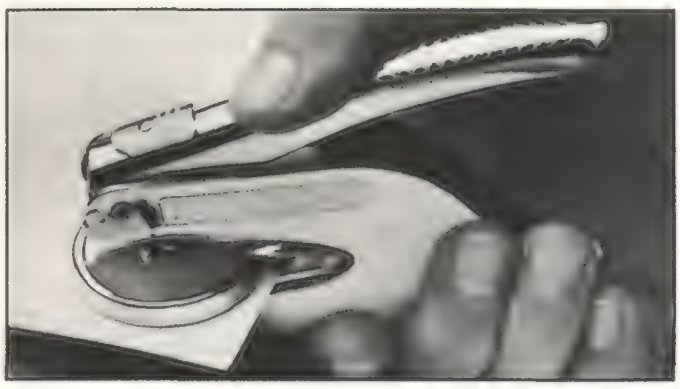

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ROBBINS MYERS

that insects were once occasionally put on trial and sometimes executed for criminal acts. Wendy Shay of the Insect Zoo staff was curious about this and asked around. The insects weren't much help, but Samuel Billings, a volunteer, was.

A retired entomologist, Mr. Billings revealed that insects were indeed put on trial during the Middle Ages. Mr. Billings is 73, which isn't really old enough for him to remember the Middle Ages, but which earns him respect from Insect Zoo visitors, most of whom are about 65 years his junior.

He produced an article from the *Journal* of the New York Entomological Society. It was written by Harry B. Weiss in 1937, and it summarizes two essays by E. P. Evans which appeared in the *Atlantic Monthly* in 1884. Mr. Evans has not yet passed the buck to anyone else, and is now hardly likely to.

The Weiss article notes that domestic animals were once tried in criminal court for homicide and executed if found guilty. Rats, mice and insects faced exorcism and excommunication for destroying crops. Bees, after killing a man in 864, were suffocated in their hive by order of the church. It was felt that suffocation would foil the devil, who would otherwise pollute the honey and render it inedible.

Insects and many pestiferous animals were thought to be readily used by Satan for evil purposes, so the church had authority to punish them. A 15th-century book divided animals into "sweet beasts" and "stenchy beasts." The stenchy ones were considered bad. Even today they're not so hot. Sometimes pestiferous insects were given official warning to get out of town in, say, six days, or else. . . .

The case most thoroughly covered by Evans and quoted by Weiss took place in 1587, when weevils got into the vineyards of St. Julien, a region of Burgundy still famous for its wines. The weevils had caused trouble here before, but prayers had sent them away. This time the church prosecuted them.

Lawyers were appointed and the case got under way. The defense noted that the weevils were earlier inhabitants of Earth than humans and that God certainly intended them to survive in the ways they knew best. After a couple of adjournments, the prosecution pointed out that though God created insects before Adam, He surely planned that they would be subordinate to Man.

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Red sandstone, quarried a century ago, is rediscovered for a castle gate.

After more postponements a compromise was suggested: a plot of land would be set aside for the use of the insects. If they left it and returned to the vineyards, they would face the church's ultimate wrath—excommunication.

Unfortunately, no one knows whether this idea was acceptable and settled the case. It seems that the last page of the written report was eaten. By insects.

When architect James Renwick planned the castle on the Mall in 1847, he foresaw heavy iron gates to close off the grounds around the structure. Some were never completed. One set, designed to face out on Independence Avenue, only recently got under way.

Historian James Goode, curator of the castle, has the plans for this south gate. They call for two cast-iron portals to hang from massive stone piers—the stone to be the same as that used in the castle. Smaller pedestrian gates will flank the large ones. Goode's first step in fulfilling Renwick's plan was to find the proper stone for those piers.

The quarry that provided the castle stone was opened in 1828 to furnish the huge blocks that would go into the locks of the Chesapeake and Ohio Canal. It was a big quarry, stretching for a mile beside the Potomac River in Maryland and making use of barges on the river and the completed parts of the canal to ship off the cut stone. By the time the castle was being built it would have been a busy

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place, the red sandstone being floated down the Potomac to Washington for Renwick's structure, and upstream toward the Alleghenies to build the many locks that were needed there. That red sandstone was one of various kinds which were tested for use in constructing the castle. It held up best.

The quarry closed down in 1923, a year before the C & O Canal also gave up, after struggling to compete with the Baltimore & Ohio Railroad, which, portentously enough, began construction on the same day as the canal, in 1828. Over the years, trees have grown tall beside the long stone face where drillers once worked, and soil has filled in the rocky detritus below. The place is owned by four jurisdictions, and the Smithsonian had to get proper permission to dig around for the chunks needed for those gate piers.

I went out to the quarry on a pleasant spring day. Great slabs of rock, the size of steamer trunks, were being loaded onto a truck bed. I wandered away until, through the new leaves, I could see the old cliff face of the quarry, seamed by the regular creases left by drills. I stared for a while, feeling the old magic of touching the past. But all visitors had been warned that the whole area was positively writhing with copperheads, newly alert in the warming air. Having a reasonable amount of nervousness about such things, I didn't explore very far.

The stones have been cut now, and are being finished by Constantine Seferlis, who so ably restored St. Dunstan (see this column for February 1981). The piers will be ready by Christmas. Book ends are being made from the scraps.

Edwards Park

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The World Wildlife Fund announces an original work of art in fine, hand-painted porcelain

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For the first time in its history, the World Wildlife Fund has undertaken the creation of a collection of porcelain sculptures of baby animals.

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This new and original work of art has been designed for the World Wildlife Fund by Eva Dalberg, one of the world's most talented portraitists of animals. Dalberg was chosen for this commission because she has the unique ability to capture the lovable quality of animals.

Here the little tiger is portrayed in an amusing—and totally unexpected situation. With a bright green butterfly perched right on the tip of his nose! This delightful sculpture will be crafted in fine porcelain and completely hand-painted. So, all the colors and features will be clear, crisp and vibrant. The tiger's orange coat and black stripes, his sparkling black and yellow eyes, his striped tail—and, of course, that devilish little green butterfly.

Surprise! will be crafted for the World Wildlife Fund, under the supervision of Franklin Porcelain of Japan. Each sculpture will be crafted in Taiwan and will be backmarked with the official "WWF" symbol. In addition, a Certificate of Authenticity attesting to its official status and bearing the signature of the Director General of the World Wildlife Fund International, will be included.

In the tradition of classic works in fine porcelain, this enchanting sculpture will be made available in a limited edition, reserved exclusively for those who order from the collection of porcelain animal sculptures during 1981. When all valid orders from these individuals have been filled, the edition will be permanently closed.

You'll enjoy displaying this enchanting little tiger in your home and showing it to all your friends. It will be a conversation piece you will treasure. And you will have the satisfaction of knowing that it is created in a long-established tradition. For, of all porcelain pieces collectors prize, small figures of animals are among the most popular.

To reserve *Surprise!* by Eva Dalberg, you should act promptly. Please be sure that your Reservation Application is sent to the World Wildlife Fund, c/o Franklin Porcelain, Franklin Center, PA. 19091, by August 31, 1981.

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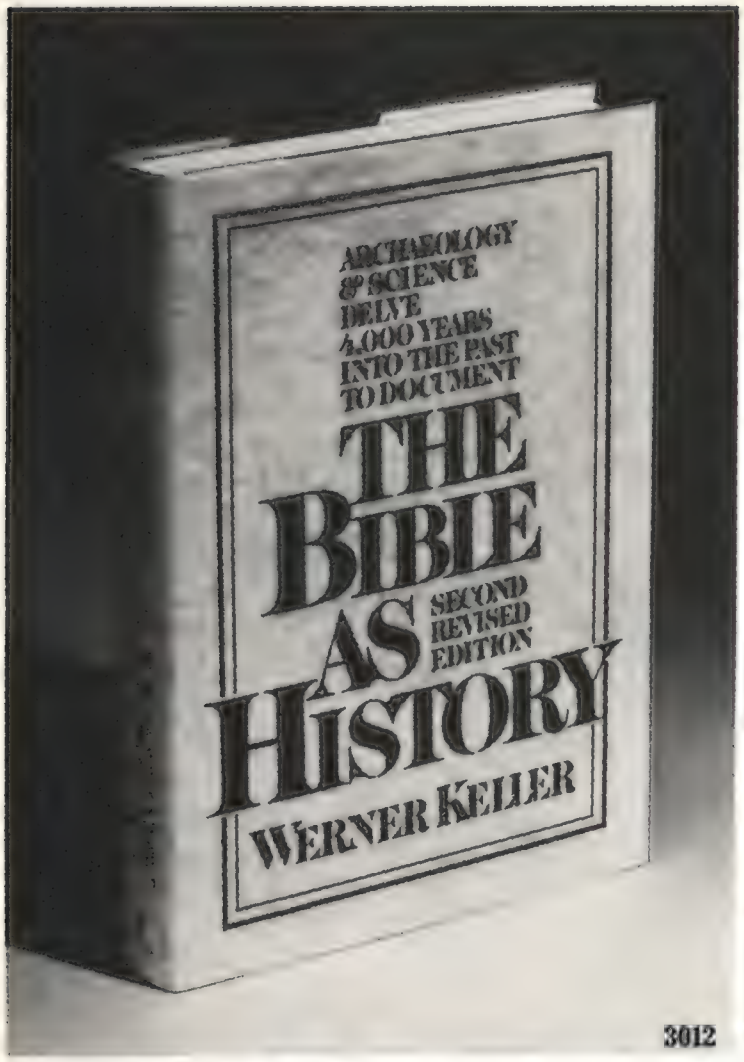
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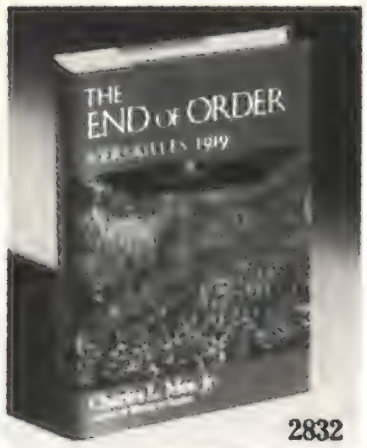

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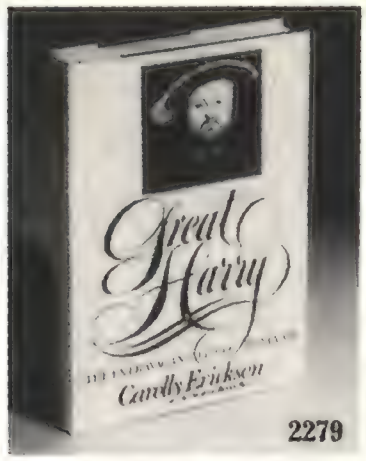

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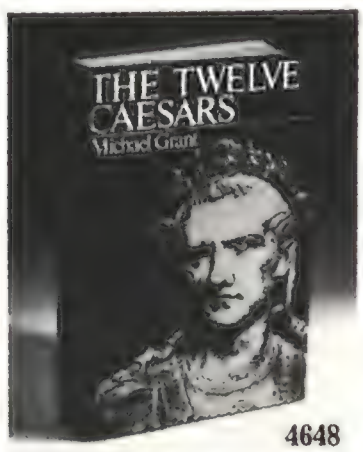

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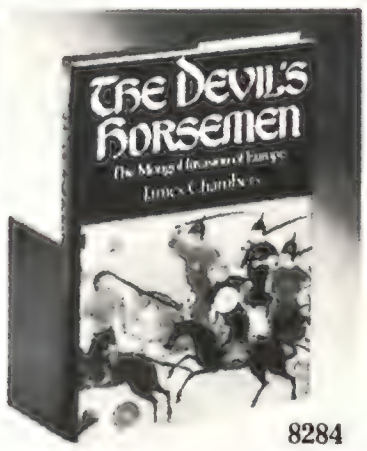

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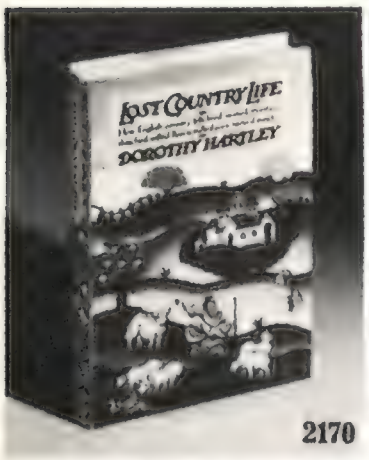

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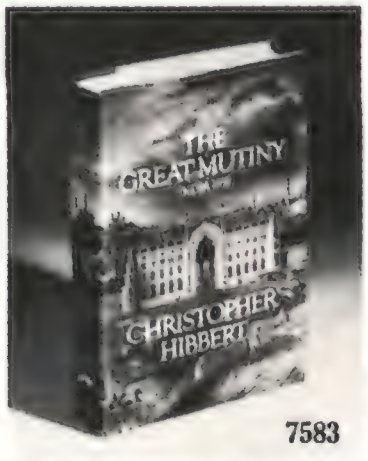

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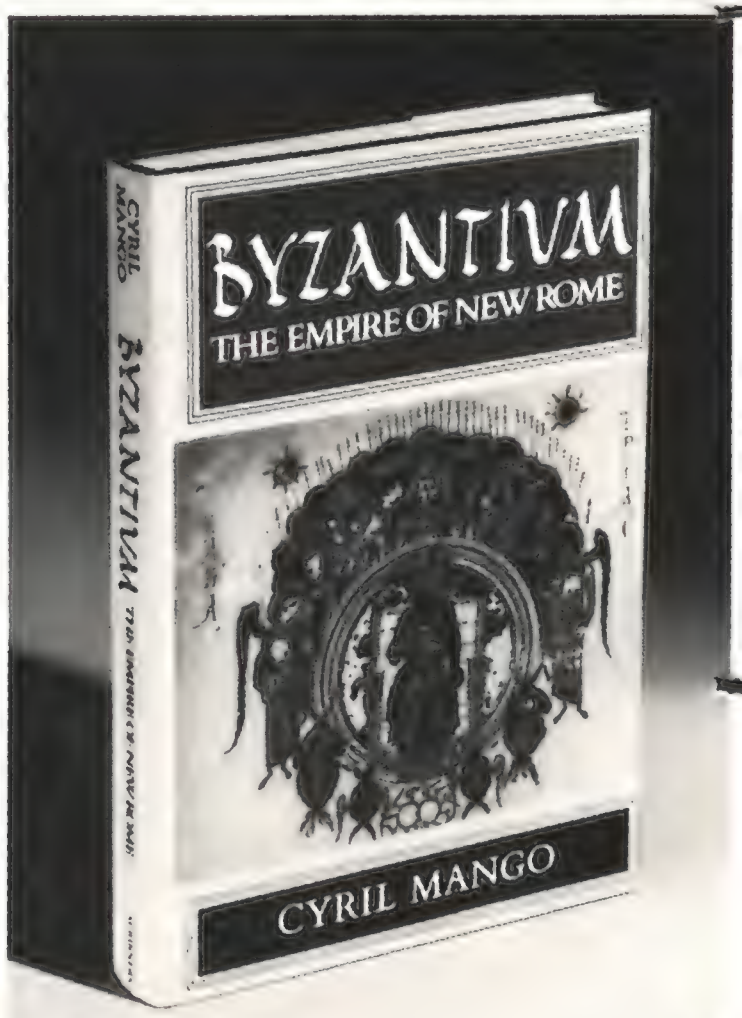

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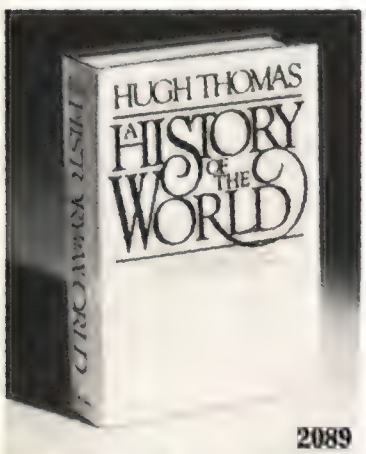

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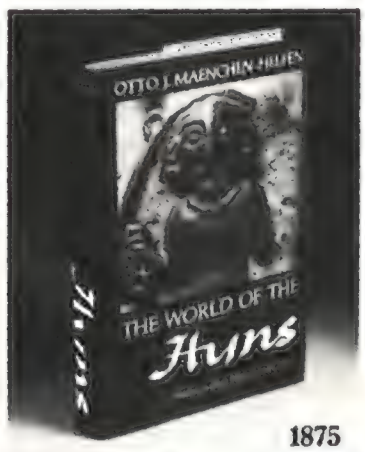

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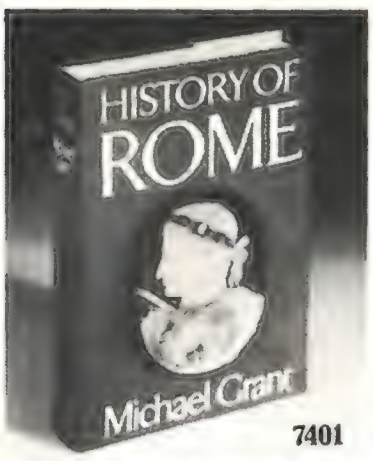

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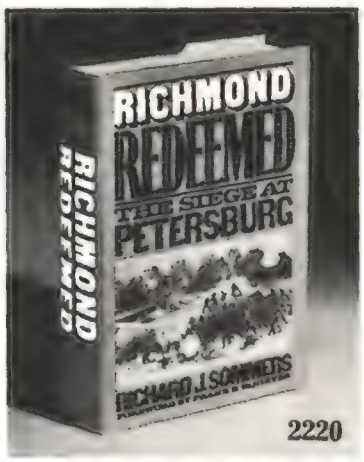

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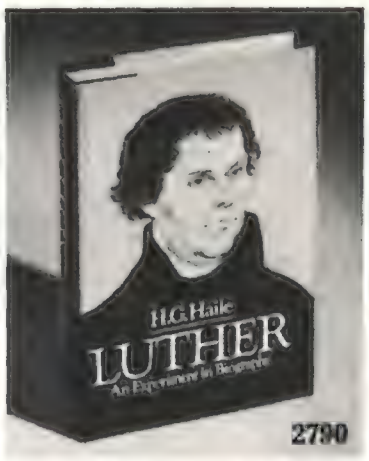

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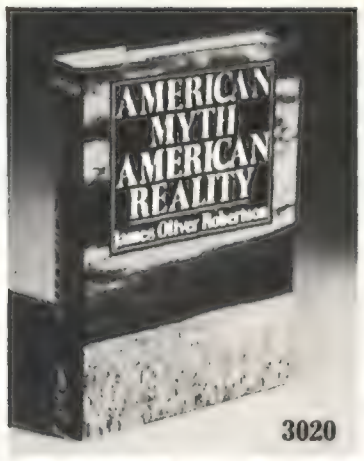

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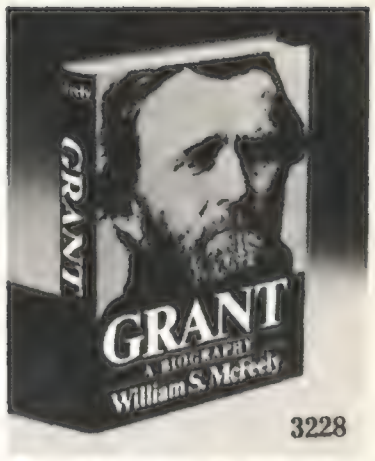

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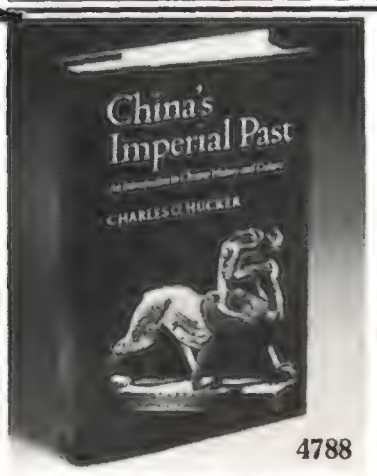

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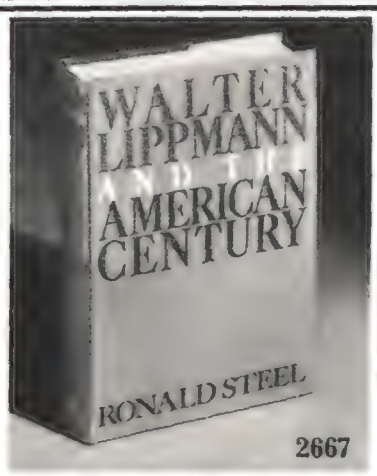

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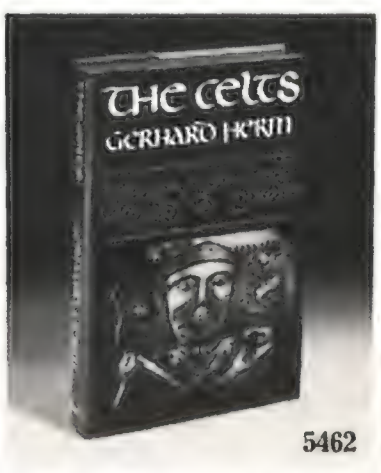

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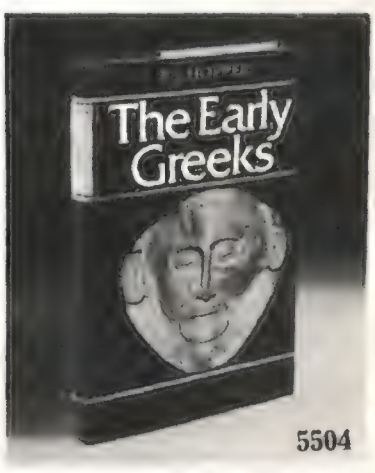

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Phenomena, comment and notes

The world around us teems with creatures that can do our work often better than we can ourselves

If you lie still on a summer night, windows wide open, you can almost hear the world at work. Worms munch their way through the ground, opening up the dirt and fertilizing it with their castings. Bats skitter through the night air, picking off recently engorged mosquitoes. Behind a munch here and a crunch there is a muted roar, like distant surf, the cumulative sound of billions of invisible creatures changing rock into soil, taking nitrogen out of the air, turning the debris of life into the nutrients on which plants, animals and we ourselves live.

Our own bodies, as we lie in bed, are crawling with them, 650,000 to the square inch, more organisms living on each one of us than there are people in the world. We are the substrates, the worlds on which they live. Our soaps and sprays hardly slow them down. To the millions that do succumb, our cleansing efforts are chemical cataclysms, as unpredictable as astrophysical catastrophes are to us. But billions always survive, and it's just as well. We could not live without them.

These are the microbes: the bacteria, yeasts, algae and molds that by definition we cannot see. They do most of the world's work, for free. And as things become increasingly tight, they may end up doing a lot more of ours, too.

In his 1976 book *Magnificent Microbes*, Bernard Dixon, a microbiologist who was then editor in chief of *New Scientist*, argued that micro-organisms offer any number of solutions to global shortages and that it was time to change our attitudes. Even after millennia of using them to make wine, beer and cheese, he noted, most people think of microbes exclusively as "germs," the agents of infectious disease. "While we proudly remember Pasteur, Alexander Fleming and their fellow microbe hunters," he wrote, "the names of Martinus Beijerinck and Serge Winogradsky, who first demonstrated our total dependence on the microbial world, have been all but forgotten."

The Dutchman and the Russian may be forgotten, but microbes are getting more attention every day. At the March meeting of the American Society for Microbiology, in Dallas, more than 9,000 delegates heard paper after paper on micro-organisms that make alcohol, break down wastes and produce protein. Apparently there are microbes that do everything but make coffee and cinnamon buns. In April, participants in the second

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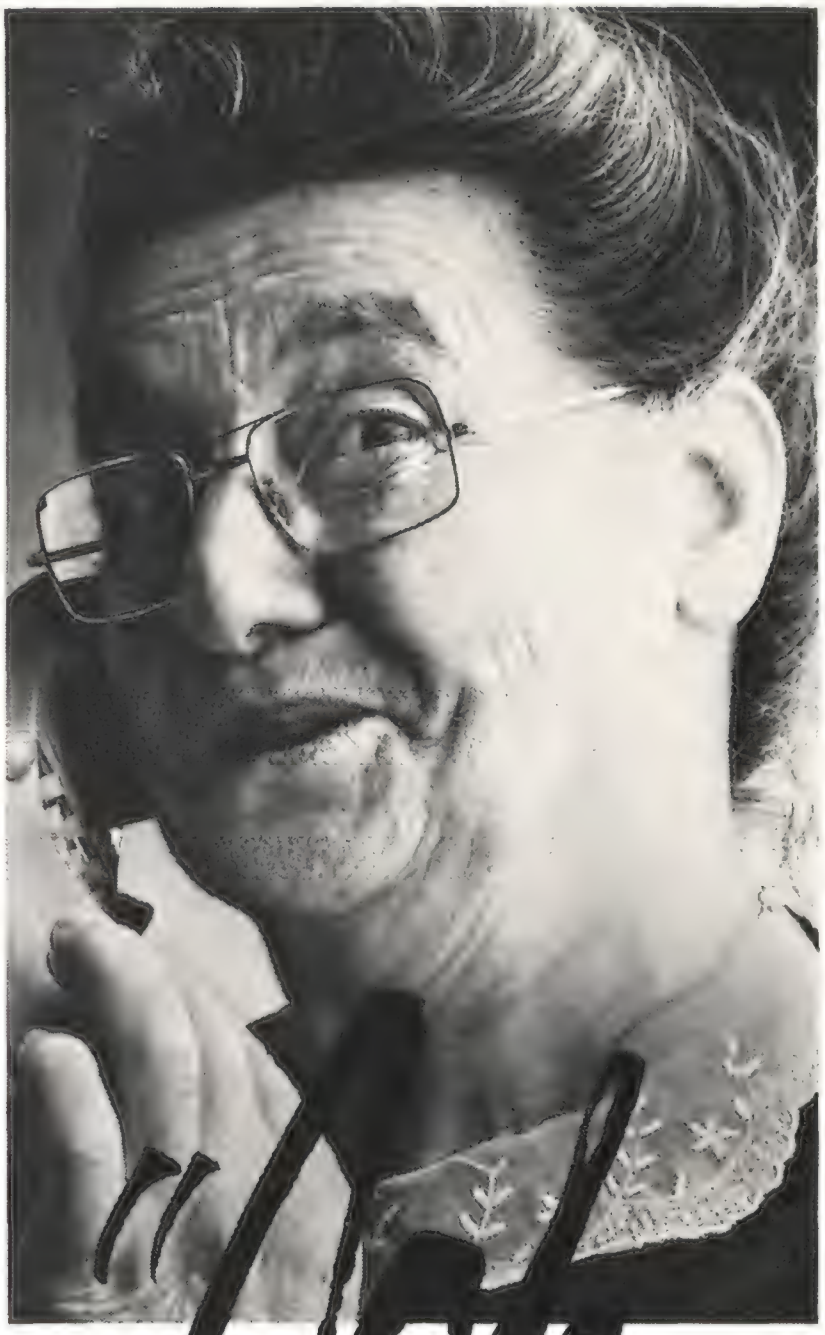

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ROYAL VIKING LINE
1982 AROUND THE WORLD CRUISES

congress on European Biotechnology, held in Eastbourne, England, heard more of the same (biotechnology is defined as the use of living organisms or their components in industrial processes).

April also saw the U.S. Congress' Office of Technology Assessment deliver a 330-page report, *Impacts of Applied Genetics*, which, among other things, lists what "natural" microbes are doing for us already. It seems they are producing antibiotics, vitamins, vaccines and hormones for drug companies—including at least 20 percent of all prescription drugs sold in this country. (And while genetic engineering may be new, genetic manipulation is not. For decades drug companies have used chemicals and radiation to force microbe mutation. One strain of penicillin was manipulated in this way until it was 55 times more powerful than Fleming's original. A line of *Escherichia coli* was improved to the point that it produced more than a hundred times more L-asparaginase—an enzyme used to fight leukemia—than the original strain.)

Micro-organisms routinely produce ethyl alcohol, citric acid and amino acids for the chemical companies. And they could quickly be mobilized to produce such basic industrial chemicals as acetone, butanol and fumaric acid, as they did until after World War II, when ways were found to make them from petroleum.

They are used to leach metals from low-grade ores, notably uranium and copper (some 11 to 15 percent of U.S. production at the moment), and could recover oil from depleted reservoirs.

For the fiber and fabric makers, there are bacteria that put together long-chain molecules that combine the elasticity of collagen, the shock-absorbing capability of cartilage and the strength of insect cuticle. A report in *New Scientist* (February 19, 1981) triggers memories of Sir Alec Guinness as *The Man in the White Suit*, who lost a lot of friends when he invented the perfect fabric.

In fact, learning to put micro-organisms to work could free us from our life-or-death dependence on petroleum, both as a liquid fuel and as a feedstock for the chemical industry. Bugs may someday make crude oil for us on demand (Phenomena, March 1981), just as they did at their own pace for so many millions of years and as they are already making the alcohol that can replace it. And bugs can

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How does one find the right bacteria? In his book Dixon describes one method that is ludicrously simple. He once worked for a chemical company that produced foul-smelling chemicals called amines. Some found their way into the plant effluent, which could not be discharged anywhere until the smell was removed. Dixon was assigned to find a microbiological technique for purifying the effluent.

He filled a cylinder with glass beads and then arranged for a solution of amines to flow through the cylinder over and over again in a closed loop. Finally he added a pinch of soil to the top of the column. After a week, the amine concentration began to fall steadily until it all but disappeared.

From the microbial life in the soil sample, Dixon explained, bacteria able to break down the amine had emerged. Well fed, they proliferated on the glass beads until numerous enough to eradicate the amine. In a real disposal system the amines would constantly be renewed, maintaining the bacteria.

The neatest schemes use microbes which can then be used for something else. Certain yeasts gobble up "sulfite liquor," a bulk waste product of papermaking, while algae thrive in sewage. Both, of course, are food.

The nice thing about micro-organisms is that they do not need special treatment. Industrial chemical processes often require high temperatures and high pressures; microbes do not. Most industrial processes involve several steps, after each of which the interim product must be purified before the next can begin; microbes do what they do at one fell swoop. And most chemical processes have unwanted by-products that can be difficult to separate and even more difficult to get rid of. The right enzyme will convert the feed stock into what you want with 100 percent efficiency.

And so it is that hidden away within laboratories, as invisible to society as the objects of their dedication, is the new generation of microbe hunters, who see in their microscopes and grow in their Petri dishes the rods and blobs not of disease but of a new bioindustrial age. Out of their unreadable papers in small-circulation journals will come new understandings of creatures that will do it all for free. And these will be creatures already plugged into the biosphere, living in harmonies that long predate the first hominid to pick up a stick and probe a termite mound.

It is indeed spectacular when we engineer micro-organisms to produce insulin, interferon and growth hormone. We can only hope that more will be on the way, and quickly. But it would be tragic to overlook the natives. They do what they do superbly. Perhaps someday we will know the microworld so well that we can let it do what we want done, work with nature instead of against her. We'll lie back in our hammocks, listen to the vats seethe and simmer, and save our time and energy for those few things that we do better than rods and blobs.

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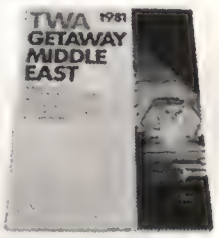

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By Kirk Varnedoe

A reappraisal of the Rodin legacy offers a new look at the master

The work of a genius who went into eclipse reemerges in a giant exhibition, years in the making, at the National Gallery of Art

In work-stained clothes, an indomitable Rodin, in 1880, began years of labor on *The Gates of Hell.*

In November of 1917 a great career was buried, twice. The sculptor Auguste Rodin himself was laid to rest, and at the same time his massive legacy began its own prolonged sleep. Scrupulous conservator of his art and of every document related to it, Rodin had bequeathed to the French nation the full contents of his studio, including more than 7,000 drawings and countless sculptural studies, plus his own art collection and a hoard of letters, bills, studio notes and press clippings. But in 1917 France was too preoccupied with a world war to make much of this inheritance, and soon thereafter the artist's reputation began to decline. Well through the 1940s, interest in Rodin languished. He seemed, on the basis of overly familiar works like *The Kiss,* too literary and romantic for modern sensibilities. Curators at the Rodin Museum in Paris patiently worked at cataloguing the principal works, but the bulk of the bequest was consigned all but unexplored to attics and basements.

Then in the 1950s, artists, dealers and scholars began to give new recognition to Rodin's role as an originator of modern sculpture. This reassessment, keyed by such events as Albert Elsen's Rodin exhibition at the Museum of Modern Art in 1963, focused on the radically untraditional ways the sculptor had modeled his surfaces and composed his forms, especially in smaller, less-well-known sculptures. The question of the Paris museum's reserves thus assumed new urgency, and pressure mounted for access to the archives.

Rodin's *Age of Bronze* caused charges that he cast from life, charges later thoroughly repudiated.

That new demand is now addressed by a major exhibition, "Rodin Rediscovered," at the National Gallery of Art in Washington, where it will be on view through January 31, 1982. On this, the largest Rodin exhibition ever staged, Elsen, professor of art history at Stanford University, as chief organizer, and a team of French and American scholars have brought to bear for the first time the full resources of his bequest. With works never previously exhibited and through new documentation, the show, sponsored by a grant from IBM, presents an artist revised, clarified and demythified in unfamiliar and unexpected ways.

Rodin's life history has always seemed a classic tale

Photographs by Lee Boltin

Rodin had this spacious studio built adjacent to his Villa des Brillants at Meudon. Against far wall is a study for *Gates of Hell*; *Burghers of Calais*, center; *Monument to Victor Hugo* appears in the foreground.

Rodin worked on *Gates of Hell*, of which this is a terra-cotta study, from 1880 until death in 1917.

of talent triumphant over adversity. He had no success at all until he was 37, and if he had died at 40 he would quickly have been forgotten. But by 50 (in 1890) he had in hand several of the most important sculptural commissions of his time, and at 60 he was without peer. This essentially self-educated son of a minor civil servant enjoyed in old age the solicitations of the rich and royal, the attentions of adoring women, and a string of international honors.

Aided by countless photographs, it is easy to visualize Rodin as a gloriously white-bearded patriarch. There are volumes, too, of the pronouncements and reminiscences he offered as a senior celebrity. But these often frustrate rather than aid our understanding of the personality of the other Rodin—the tensely serious, red-haired young sculptor who had long before laid the ground for that success.

He was born in Paris in 1840 and passed an adolescence without particular distinction in education or in art. Leaving school at 14, he moved with grudging parental consent to a government-run art academy, and then tried three times to gain admission to the prestigious Ecole des Beaux-Arts. When he was turned down for the third time, at the age of 18, it seemed he would enter adulthood destined only for a mediocre artisan's career.

In the bequest, however, there is explicit evidence to the contrary in the form of drawings Rodin frugally conserved from his earliest years. These tattered,

Commissioned for a building never built and left only as studies at the time of Rodin's death, *Gates of Hell* wasn't cast in bronze until 1928. The version shown above appears at the Musée Rodin in Paris.

Throughout his life Rodin made many thousands of meticulously observed drawings, central to his art.

heavily worked-over sheets attest to uninterrupted self-education and constant rethinking of sculpture in a highly personal mode. When the opportunity finally came, in the form of an 1880 governmental commission for a multifigure bronze portal (*The Gates of Hell*), Rodin was thus armed with an untapped fund of ideas and ambition, built up in slowly maturing concentration over the previous 20 years of anonymous apprenticeship.

Much of Rodin's life in these years is lost to us, but what we can piece together shows an unexpectedly complete development. In maturity he was renowned, and caricatured, as a lecherous satyr. He had a passionate ten-year affair with a beautiful young artist who worked in his studio, Camille Claudel. The dancer Isadora Duncan—who told in her autobiography of the 68-year-old artist's attempts to "model" her flesh when they were alone in the studio—also testified to his unabashed expression of erotic appetites. Yet as a child he seems to have been a frail mother's boy who clung devotedly to his older sister Maria and who came to manhood very late. Maria died when Rodin was 22. His grief was so intense that he renounced the world to join a monastic order—only to be dissuaded and returned to his career by a priest who discovered his talents.

It was after this emotional crisis that Rodin began to establish a life independent of his family and formed his first—and most lasting—relationship with a woman. Rose Beuret was a seamstress when Rodin met her, but she soon became a full partner in his art as well as in his life. Besides posing long hours in ill-heated studios, she cared for both Rodin's sculptures and their illegitimate son. The letters they exchanged provide glimpses of a man who was not maliciously neglectful, but who unhesitatingly sacrificed himself and those around him to his ambitions. Under the adversity his early career inflicted, Rodin grew stronger; but Rose aged prematurely and their son showed increasing signs of mental deficiency.

Marriage came only in 1917, in the couple's last days together, in a pathetic ceremony the state thought necessary to ensure a legal heir.

Rodin's escape from anonymity depended, however, not on will and work alone, but also on historical circumstances. His arrival at artistic maturity in the late 1870s coincided with an exceptional moment for sculptors, determined by the "statue mania" of France's Third Republic. After a crushing defeat by the Prussians in the war of 1870-71 and the bloody suppression of Paris' rebellious Commune immediately thereafter, the new government of France set out to promote patriotism and "moral rebirth" by conferring on the streets and parks of the nation an unprecedented tonnage of monuments.

The National Gallery's exhibition sets Rodin with-

The author is a professor at New York University's Institute of Fine Arts and wrote the section on drawings and photography for the exhibition catalog.

The Crouching Woman, plaster, above, and cast in bronze, right, is another Rodin figure which was designed for *Gates of Hell,* where it is placed on upper right door frame and in back of *The Thinker.*

in this historical situation, and specifically in the context of the yearly Salon exhibitions where his works were first displayed. In an 1870s decor, his early figures are displayed beside those of his contemporaries.

The Age of Bronze of 1877, Rodin's first major Salon entry, fit the popular vogue for Florentine Renaissance realism, and evoked—especially under its original title, *The Vanquished*—France's tentative, painful awakening from the traumas of 1870-71.

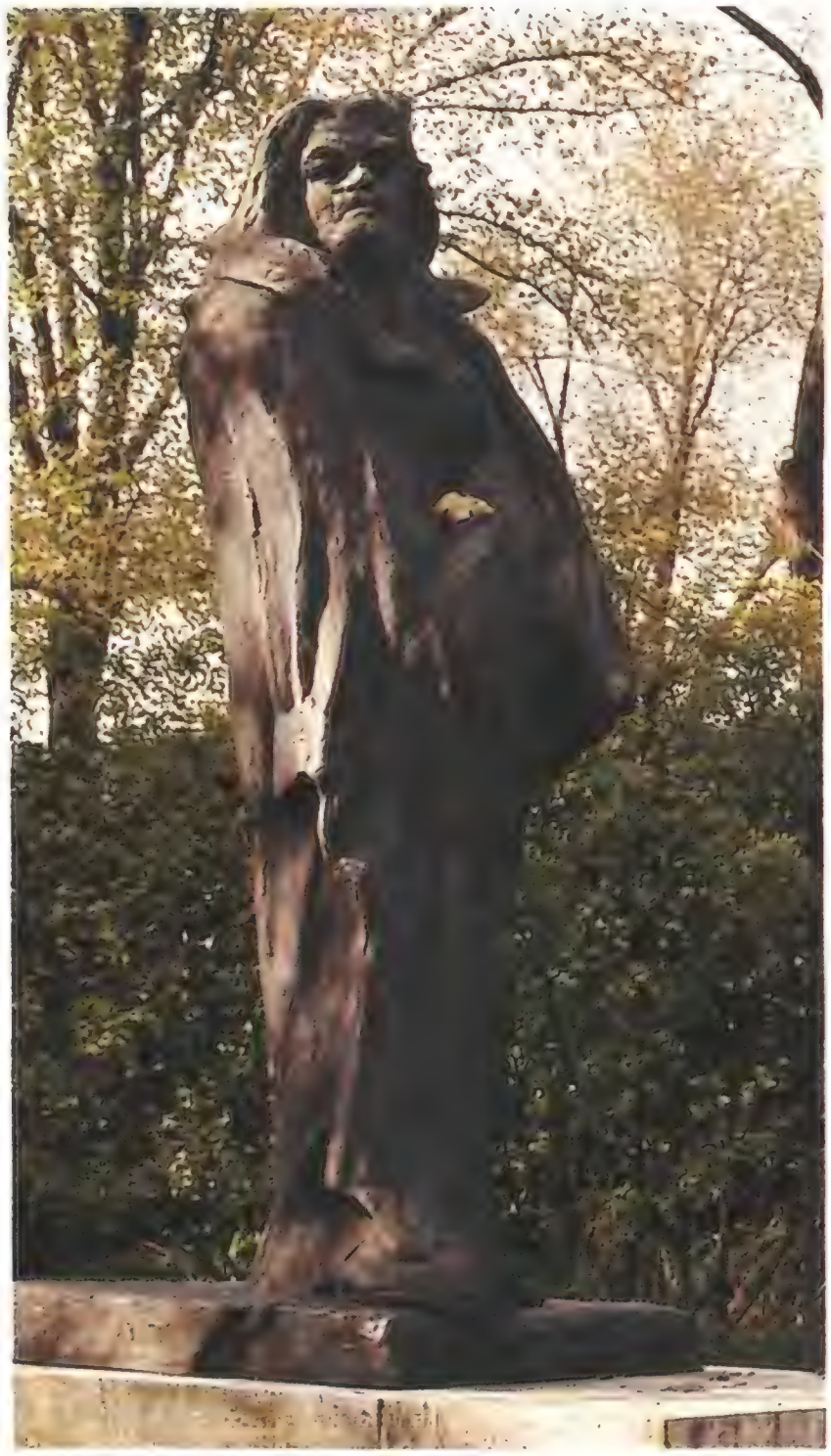
The competition for such monuments was intense, since sculptors (unlike painters, whose material costs and investments of time are comparatively small) could not often afford to work without a guaranteed client. Hence the importance to Rodin of the commission for *The Gates of Hell* at a crucial point in his life. The portal, originally intended to present scenes from Dante's *Divine Comedy* (a familiar Salon subject), was part of a typical public-works project of the liberal Republic. It was to adorn a proposed decorative arts museum, intended as an institution to affirm the progressive ideals of unifying art and industry. Though the museum was never built and the *Gates* were never officially completed, the commission gave Rodin a free government studio and a series of advance payments.

The steady flow of commissions that followed, and that eventually established Rodin as the premier sculptor of his time, was not a matter of luck. He won these by competition, overt and covert, and his correspondence suggests how he did it. Acutely conscious of the power of critics and of the politics of public patronage, he worked constantly to cultivate friends, isolate enemies and get himself on the inside track.

No other artist of his time so effectively used the studio as an environment for showing work and molding opinion. As the exhibition demonstrates, Rodin began early on to attend to the extension of his work by photography, collaborating with cameramen to record sculptures from the points of view and under the lighting conditions he found most telling. He first used those photographs as studio aids, but soon became aware of their potential for influencing public vision. At his one-man exhibition in 1900 he sold interpretive photographs of his work cosigned with the photographer Eugène Druet. Thereafter he not only collaborated with artist-photographers such as Edward Steichen, but also paid photographic agents to

control reproduction of his works in periodicals around the world.

The nerve center of this operation, and the forum Rodin most frequently used in his conversations with critics and admirers, was his genially cluttered studio. This environment is evoked in the Washington exhibition where *The Gates of Hell*—a bronze version, nine tons, 20 feet ten inches high—is surrounded by the dependent world of figures connected with it. Throughout Rodin's life after 1880, the huge plaster form of this portal dominated his working space. He called it his Noah's Ark, the vessel that bore the whole kingdom of his ideas. *The Thinker,* for example, was first conceived for the portal's tympanum. Brooding, as the creatures of his imagination swirled around him, he



Balzac, Nude was an early study (1893) for the heroic *Monument to Balzac,* right, a massive portrait of the author which was also Rodin's testament to the spirit of creation. It outraged everyone.

embodied both Dante as author of the *Inferno* and Rodin as creator of the door. But like many other works born in the *Gates* project, it was then given a second life as a more general symbolic sculpture.

The Thinker went on, aside from its central focal position on the *Gates,* to become one of the world's most widely known sculptural figures, a composite repository of the image of Man struggling with the very idea of existence. In time it proceeded, in various sizes and materials, from a symbol of academia to all of the representations the fruitful minds of advertising men could find for it, from the sentimental to the comic. For Rodin it was an essential image, the figure he designated for his tomb at Meudon.

In the portal, as elsewhere in Rodin's mature art, his figures are constantly in restless transition. Goaded into ephemeral extremes of extension and compression, they never know the solace of composure, and achieve a kind of stability only tentatively and with difficulty. The evolution of the door and its dependent figures are symptomatic, too, of the ways his works were always prey to movement and change of a different sort. In his working process, each group and each individual figure might move from parts to whole and back to parts several times, mutating into countless variant forms as it did. His studio, filled with the plaster refuse of figures being put together or broken down, appeared like some ghastly charnel house. Every body and every part was always on call, prone to be split, spliced, enlarged, reduced or transposed into a new material.

Rodin immortalized *Burghers of Calais,* who gave themselves as hostages to the British in 14th century.

Genius at work

We may be accustomed to think of Rodin as a demon of fevered inspiration. His figures are passionately modeled, and their modeling often takes life from the effects of apparent recklessness. But access to the underpinnings of his work allows us to relocate his genius, not just in this evident heat of impulse but in his intense concentration and capacity for enormous efforts of patience, editing and preparation.

The quasi-industrial processes he used affect everything we know of Rodin's sculpture. His marble works were carved, often in several examples, by assistants using measuring devices to transpose correct proportions from plaster reference models. His bronzes were produced by professional foundrymen in editions from which no single "original" can be isolated. Furthermore, several of Rodin's best-known creations, such as *The Gates of Hell* and the *Balzac,* were never cast in bronze during his lifetime. They exist in metal only via limited editions cast posthumously by the Rodin Museum, acting on rights conferred in Rodin's will. (The bronze *Gates* exhibited in Washington was commissioned by the American collector B. Gerald Cantor and completed only this winter.)

Multiple "originals" exist in all reproductive arts, including printmaking, and they are common to the condition of modern sculpture. The case of Rodin is especially problematic because his works command such high prices and because the posthumous casts have been notoriously uneven in quality.

Duplication may seem to confound our grasp of Rodin by distracting us from his touch. But there are important senses in which we cannot understand his work without reference to the interlock between improvisation and instinct on the one hand, and the mechanics of duplication on the other. Nowhere, for example, are we more directly in contact with the artist than in his small plaster studies. These eggshell-delicate pieces (like the lovely piece on the cover, which is not included in the exhibition), rich with the impress of Rodin's hands, were the prime locus of his creative exploration. Yet Rodin felt free to experiment as he did with a given plaster—cutting, patching, assembling with other bits—precisely because it was not an irreplaceably unique form, but only one cast among many made from an earlier clay study.

Consider further the processes of translation by which Rodin's small studies then became the bronzes and marbles with which we are familiar. A stray slurring of clay that pleased him, or the expressively tattered edge of a segmentation, had to be carefully cast and then faithfully transposed into a new material, often being enlarged or reduced by painstaking measurement. His disrupted surfaces and fragmentary forms became influential in modern artistic language not simply because they happened once in the course of modeling, but because they were subsequently selected, preserved and given permanent form. Chance was captured and made potent through the labor of

Designed for a central position for the *Gates of Hell*, Rodin's *Thinker* represented a creator as well.

assistants and the accuracy of machines. Without these the innovations would have remained all but mute in isolated sketches.

Rodin understood that repetition had a power, not only to facilitate experiment and project into sculpture the boldness formerly left behind in the sketch, but also to generate an expressive value of its own.

In *The Three Shades* atop the *Gates*, for example, the tripling of one figure establishes a drumbeat rhythm that intensifies the gesture of despair. Throughout the *Gates*, the recurrence of identical or near-identical parts, figures and groups serve to break up the normal flow of narrative time and suggest instead an endless cycle of suffering. The six figures of *The Burghers of Calais* share repeated hands, legs and even heads, with similarly dolorous effect. That Rodin composed in this fashion from multiple fragments might not in itself be exceptional. In choosing not to mask the procedure, but to exploit it openly as an expressive device, he did something strikingly modern.

This body language, like Rodin's large figural compositions, did violence to traditional canons of artistic unity, finish and order. But it brought into sculpture a new and peculiarly modern range of human experience.

Rodin is widely admired as a brilliant illusionist, a master of anatomy even in the most difficult gestures. Commanding his models not to pose but to move freely in front of him, he constantly challenged these skills in trying to capture the ephemeral moments when the body's spontaneous movement yielded a new, unguarded emotion. But if we study his figures closely, we see that their truth to emotion often depends on anatomical impossibilities, and is based on more than virtuoso imitation. In exhibiting parts of figures as independent sculptures, he asserted that a work was finished when its thought, not its configuration, was complete. The evident traces of modeling, assemblage and casting he left in his forms further declared that the actions of the artist and the life of the material are as valid means of expression as the muscles and movements depicted. In this sense the subjects of the sculptures are not just their literary and symbolic themes, but also the processes of their making, and Rodin himself.

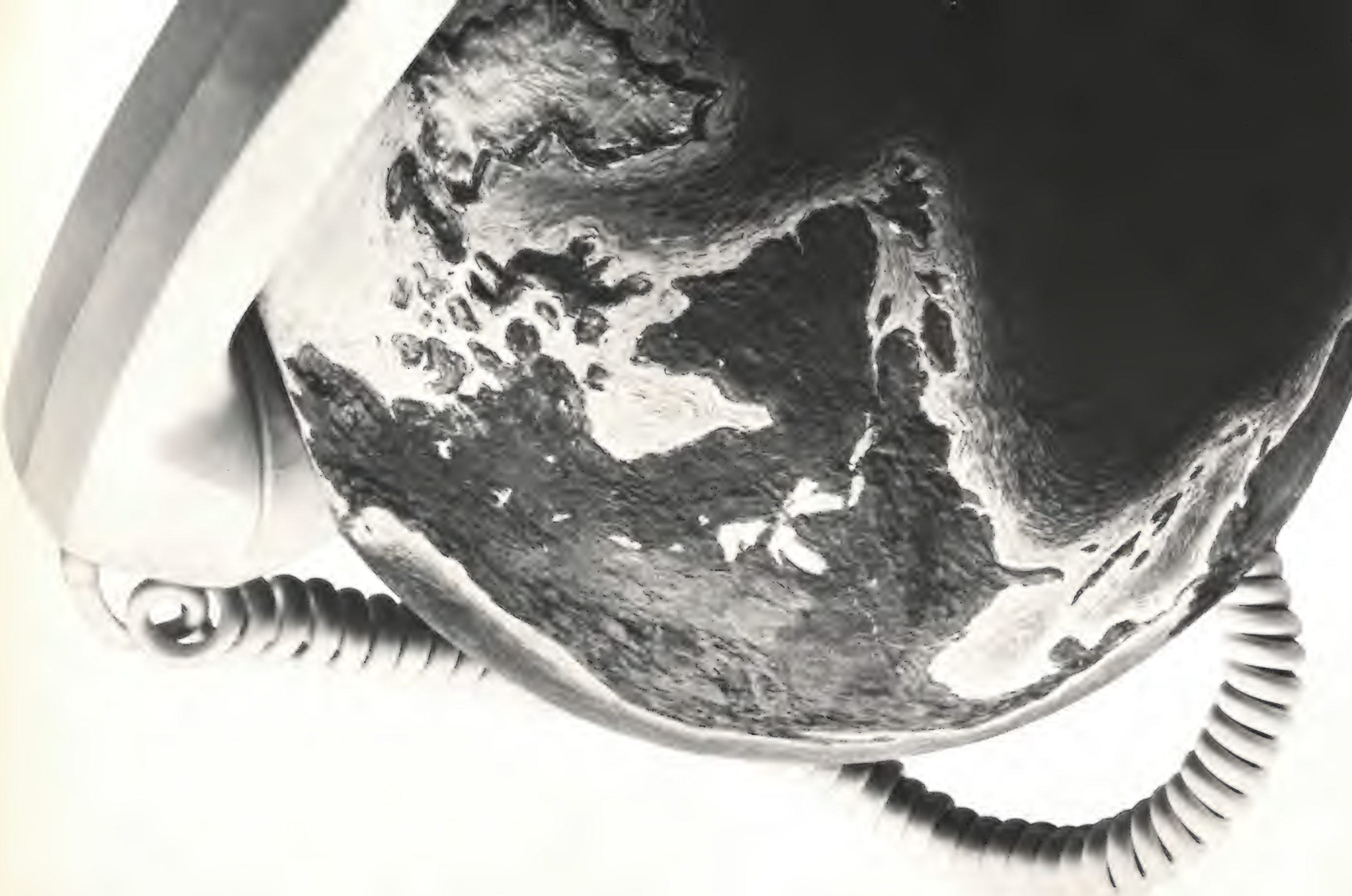
He is the implied subject, too, of his numerous images of creators and creation, displayed in a special section of the Washington exhibition. His earliest such representation, *The Thinker*, is tensely constricted in a way that honors the effort, physical and mental, needed to make art. But the homage to Balzac's genius, sculpted as Rodin was nearing 60, has a sweeping vertical thrust and explosively distorted features that evoke a more involuntary, consuming force of ecstatic inspiration.

At the end of a life of immense productivity, Rodin felt that his legacy would be incomplete if it did not include, besides all the evidence of his organized planning, this central sense of wonder as well. He spoke to an interviewer with justifiable pride, but with an awareness of his inability to fully explain all that he had achieved:

"I am still suffering, but the will must dominate; if I hadn't been stubborn, I would not have done what I have done. The art of the sculptor is what I have done. The art of the sculptor is made of strength, exactitude, and will. In order to express life, to render nature, one must will and will and will with all the strength of heart and brain; nature exceeds—and greatly—human genius; she is superior in everything; to believe that you can equal her, to believe that you can create outside her is as stupid as wanting to measure the stars with your hands. . . . Before nature, I am plunged into infinite admiration.

"For every one of her beauties that she shows us and that we express, there are a hundred, a thousand that escape us. We know only parcels of truth. There are unknown forces in nature; when we give ourselves wholly to her, without reserve, she lends them to us; she shows us these forms which our watching eyes do not see, which our intelligence does not understand or suspect. In art, to admit only what one understands leads to impotence."

The force of expression was, for Rodin, to be found everywhere in the body, as in *The Cathedral.*



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GTE

By Patricia Curtis

Animals are good for the handicapped, perhaps all of us

The increasing use of pets in therapy reveals that horses, dogs, cats and other creatures provide something more than companionship

In a large indoor riding arena in Michigan, an 11-year-old girl with her legs in braces, clambers, with help, aboard a gentle horse and rides capably off, wearing a big smile.

In a health center for the elderly in Chicago, a wan and silent white-haired woman in a wheelchair brightens dramatically as a fuzzy puppy is placed in her lap. At a children's hospital across town, a little boy in traction giggles and plays with a kitten that has been brought to his bed.

In a hospital for the criminally insane in Lima, Ohio, a man who many years ago bludgeoned and robbed someone cares for his pet hamster tenderly.

What is going on in all these places? The common denominator is the animals, which offer far more than recreation. These companion animals are being used very specifically as adjuncts in the therapy of disabled people. Over the last decade there has been a rising trend in developing and exploring new ways of using animals in a nonexploitative way for human beings who need their special qualities. In addition, recent research suggests to medical and social scientists that companion animals may be good for all of us, even perhaps therapeutic in ways we are only beginning to discover. The bond between people and their pets is now the subject of respectable scientific scrutiny. Since communion with animals is so helpful to the disabled, perhaps it is beneficial to the able as well.

The first systematic and widely organized use of animals for handicapped persons was with guide dogs for the blind, first developed in Switzerland and Germany early in this century. These noble, hard-working beasts leading their owners are by now a familiar sight. More recently, dogs also have been trained to aid the deaf, and to fetch and carry for people confined to wheelchairs. Some 30 years ago, in England especially, word began to spread that riding horses offered more than just recreation to physically disabled, retarded or emotionally damaged people. Then, spontaneously, here and there in Europe and North America, pets began to be used in therapeutic situations for the emotionally and mentally handicapped. A dog named Skeezer lived at the University of Michigan Children's Psychiatric Hospital, not as a mascot but as a valued contributor to the children's therapy. An ingenious team of psychobiologists, Drs. Samuel and Elizabeth Corson at Ohio State University, introduced pets into a psychiatric hospital, with dramatic positive effects on many of the patients. Therapists discovered that pet animals could act as catalysts in reaching withdrawn or depressed persons, and the term "pet-facilitated psychotherapy" (PFT) was brought into the language.

One way to understand why companion animals may be beneficial to our health is to see firsthand some of the ways they help the handicapped.

In Children's Memorial Hospital, Chicago, a young cancer patient hugs puppy with simplest love.

Photographs by Eugene Richards

Horseback riding as therapy

This morning at the Cheff Center for the Handicapped in Augusta, Michigan, several children on horseback are in the 200-by-86-foot arena for the first class of the day. They are little more than tots, each with a physical disability. Some of them are held in the saddle by adults on both sides, some require only one side walker, some can sit unaided. Each horse or pony is led by a man or woman from Cheff's pool of devoted volunteers. (We learn that one of them, Hazel Ake, is 74 years old and had polio herself as a child. "I'll be coming here to do this as long as I can walk!" she declares.)

At instructor Kelly Love's command, the volunteers lead the horses at a trot, the children bobbing in the saddle. The horses are also led over poles laid on the ground; the horses' slightly rolling motion as they step helps improve the children's balance. Then the horses line up and stand perfectly still while the youngsters do stretching and reaching exercises in the saddle.

Kelly Love watches a vigorous little girl at the end of the arena and says, "When she started coming here two-and-a-half years ago, she had been hit by a car

and suffered brain damage. She had no muscle tone, sat on the horse like a sack of potatoes, had to be held on by two side walkers. Look at her now."

"Each person who rides here benefits in his own way," explains Lida McCowan, director and general factotum of the Cheff Center. "The physical exercise stimulates muscles that can't develop in wheelchairs. And the emotional pluses are phenomenal—when they're on horseback, these people are equal to anybody. That means a lot."

After this class, a group of eager children eight or nine years old is mounted. They seem to have nothing wrong with them, yet we are told they all have learning disabilities. They come in a bus once a week with their special-education teacher from a public school nearby. "I'll tell you one thing—this is the brightest spot in these kids' lives," she says.

Mrs. McCowan runs a tight ship. A lifelong horsewoman, she trained for this work in England, and Cheff is the oldest center purposely built for therapeutic riding in North America and the largest in the world. Today, there are about 160 centers in the United States and Canada that are accredited by the professional association, North American Riding for the Handicapped. Cheff provides riding to some 230 variously disabled people of all ages, free of charge, every week, year-round.

In addition, Cheff offers two courses, one month and three months, to student instructors. They come from all over the country and from many backgrounds.

The students learn barn management, horse care, safety, physical therapy, human anatomy, and information about the various disorders they are likely to meet in riders, including muscular dystrophy, paraplegia, spinal bifida and cerebral palsy.

"One characteristic common to cerebral palsy victims is tightness of the adductor muscles [located in the thigh]," says Mrs. McCowan. "This can be corrected by surgery, but we have found that riding often makes surgery unnecessary. Trying to sit astride a horse subjects the adductors to 'passive stretch' as opposed to 'forced stretch,' but sometimes it may hurt a little at first. So we start the riders out only a minute at a time on horses with very narrow shoulders, and then lengthen the sitting time gradually. Eventually they can ride comfortably. But you must have trained people doing this work. You can pull someone's hip out of joint if you don't know what you're doing. Also, riding is not for every type of disability. You have to be able to judge who can benefit."

Patricia Curtis writes books and articles mainly on animals. Her latest book, for teen-agers, is on training animals to help the handicapped and elderly.

At Cheff Center, paraplegic but athletic Lorrie Martin, riding student for three years, prepares to dismount.

For a moment, a happy Tod Davis, at Cheff Center for the Handicapped, Augusta, Michigan, is free.

Assisting Mrs. McCowan in the operation of Cheff are her daughter and son-in-law, Bliss and Buster Brown, as well as Kelly Love, two stable hands, a part-time physical therapist and a secretary. "But it's really the horses who should get most of the credit," Mrs. McCowan says. She tells us about the time a child fell off into the deep soft sod of the arena (it happens, though there has never been an injury to a child at Cheff). The youngster landed right under one of the horse's front feet, which was in midair. "The horse froze instantly with his foot lifted," Mrs. McCowan relates. "He stood there the whole 15 seconds that it took for us to reach the child and lift her. Then he put his foot down. The horses *know*. I swear they understand that these people need special care."

We are in Chicago, entering the large physical therapy treatment area at the Johnston R. Bowman Health Center for the Elderly. The room is filled with aged men and women in wheelchairs or using walkers or on treatment tables. We are with staffers and volunteers from the Anti-Cruelty Society (ACS) on one of their regular visits. And our arms are filled with puppies—several fat and fluffy brown charmers and a tiny black-and-white one named Geraldine. We fan out around the room, offering pups to whoever wants to hold one.

"Old people really love it when the pets visit," says Bonnie Friedman, at the time recreation therapist at Bowman. She tells us of an elderly stroke victim who could not speak and showed no response to anyone or anything. This woman was without friends or family and had withdrawn into total silence and apathy.

"Someone put a puppy in her lap," recalls Miss Friedman. "Suddenly she smiled and began to pet the dog. It was a real breakthrough. Normally, the pa-

Parents and their two-year-old at Children's Memorial show instant, healing joy over a puppy's visit.

tients only hold the pets for a little while because others are waiting their turn, but this lady wouldn't give the puppy up. When it came time for the ACS people to leave, they had to take the puppy from her, and she wept. A few weeks later, when the pets were coming again, we made sure to tell her. She was waiting in the hall in her wheelchair when they walked off the elevator. She held out her arms."

"As our visits continued," adds Mary McLaughlin, coordinator of the Anti-Cruelty Society's "pet therapy" program, "we would give her a puppy, and she got so that she would wheel around the floors and show it to the other patients herself. She began to try to speak and to interact with people again, and became much more alert and content."

Programs for taking pets from shelters to visit hospitals, nursing homes and other institutions exist in many cities. These programs require real managerial ability. The best of them are carefully orchestrated by the project directors from the humane societies in close harmony with the recreation directors or other persons in charge at the institutions where the visits take place. The success of the Anti-Cruelty Society's program lies in Mary McLaughlin's tact and sensitivity in screening volunteers and in winning the trust and cooperation of the hospitals.

This evening we go with her to Children's Memorial Hospital with another batch of pets and ACS volunteers Jan Rook and Ginny Anderson. We're to be escorted on our rounds by Chuck Jacobowitz and several other hospital volunteers.

"When we first got permission to bring pets here, some of the doctors and nurses disapproved," Miss Anderson tells us. "They envisioned mess, noise, germs, all sorts of problems. Now, they welcome us because the pets do the kids so much good."

Children in bathrobes trot up and down the halls, are pushed in wheelchairs or carried about by parents. They lie in beds, bandaged, in traction, surrounded by toys. A blond toddler reels about the floor of his room with his toys, cheerfully dragging a long cord by which he is attached to a machine that keeps him alive. A six-year-old strolls by wearing a baseball cap that keeps falling over his eyes. ("Some of the children in chemotherapy lose their hair, so they are given caps to wear," someone explains.)

Even though many of the children are very sick or badly injured, almost all are eager to hold the pets. A beautiful child in pigtails sees us in the hall and her eyes grow wide. Her mother props her up. The little girl cannot speak and lacks motor control of her arms, but she manages to draw Miss Anderson's hand close to her face so she can nuzzle a kitten.

A quadriplegic boy of about 12 is asked if he would like to see a dog. "Yep," he whispers. The pup's warm body is held against the boy's cheek. He smiles.

A wisp of a child attached to bottles and machines lies in her mother's lap in another room. Quietly we ask the mother if the child would like to pet a kitten. We are abashed in the presence of so much pain. But the child smiles, raises her hand to run it over the kitten.

At the end of the evening, one of the hospital volunteers, a young advertising executive, retrieves his coat and his copy of *Barron's* from a locker. "I come here one evening a week," he says. "It helps me keep things in perspective."

A day later, in Ohio, we wait in the gatehouse of the maximum-security Lima State Hospital for the Criminally Insane. Living here are some 350 people who have been declared insane in court proceedings, or who have become unable to cope while serving time in state penitentiaries.

Social worker David Lee leads us through various security checks to his ward. We meet Steve Sellers, a special-education teacher for retarded patients. Our group is trailed by various patients, who are unfailingly helpful and polite.

In Lee's ward, the men—whatever violence they have committed against others or themselves in the past—are now almost recovered or are functioning fairly well on medication. There is an air of amiable, relaxed permissiveness—open doors to the rooms, posters

Puppies brighten long days of patients at Chicago's Johnston R. Bowman Health Center for the Elderly.

Pets for the handicapped

A patient at Lima State Hospital for the Criminally Insane in Lima, Ohio, with one of his pets, a cockatiel.

and murals on the walls, neatly made beds, and everywhere fish tanks, birds on perches, hamsters, guinea pigs and gerbils in cages.

"All this started six years ago when one of the patients found an injured wild bird and tried to nurse it," David Lee says. "I noticed many of the men got involved with it, and it gave me an idea. I got permission and some money from the superintendent to buy a fish tank and two parrakeets as an experiment. Some of the men became very nurturing toward them, and interest spread through the hospital. Then one day, a fellow who was leaving to serve out his time in prison swiped a parrakeet—we found it in his duffel bag. He loved it and couldn't bear to leave it behind. I decided the guys might benefit from having pets of their own and the responsibility of caring for them. Of course, we don't just turn an animal over to anybody who asks for one—the patients have to earn the right. Each person has to convince us he is ready to take care of an animal.

"The effect on the patients has been dramatic. I don't mean to imply that the animals alone cure or socialize anybody. But they certainly establish trust and communication between the therapists and these mentally or emotionally disabled prisoners."

Haven't there been any instances of animal abuse? Lee believes that nobody would dare harm a pet for fear of retribution from other patients.

A greenhouse for plants and animals

In a courtyard are two deer, several rabbits and a talkative goose. One of the deer is so tame it comes up to snoop in your pockets for treats, but the other is shy. "That one came from a zoo where vandals had stoned it, and it was not recovering well. The zoo gave the sickly animal to us," explains Lee. "The men nursed it back to health, but it may never be really friendly."

Lee, an anything-is-possible sort of person, took us out to see the greenhouse where the men raise plants to sell to support the pet program. The greenhouse had been abandoned for years and was tumbling down. Now it is a jungle, pulsing with life. Some gargantuan plants are trying to grow out through the roof. Last year, an alley cat got in through a hole in the roof and had kittens. They needed medical care, so the men raised them on bottles and gave them to staff members at the hospital. "We couldn't keep them because of all the birds," Lee points out.

One patient has an elegant sulfur-crested cockatoo that he is visibly proud of. A big green parrot named Roscoe sits on his owner's shoulder and exchanges kisses with him. "I was pretty depressed when I got him," says this patient. "Now, he's my friend. I wouldn't sell him for anything. Animals don't care

Parrakeet named Rev, short for Reverend, nestles on John Grandy at Lima State Hospital. Grandy also has gerbils and two guinea pigs that he carefully nurtures. Pet program began at Lima six years ago.

where you're coming from, they'll like you anyway."

None of what we have seen would surprise Aaron Katcher, a professor of psychiatry at the University of Pennsylvania. Dr. Katcher is part of a multidisciplinary group called the Center for the Interaction of Animals and Society, which is studying the bond between human beings and companion animals. Headed by animal ecologist Alan Beck, the researchers include ethologists, veterinarians, biologists, anthropologists and social workers. Dr. Katcher's research in this area began with a study of heart-attack victims who recovered and went home. A year later, it was discovered that pet owners survived significantly more frequently than the patients without pets. As a result of this study, Dr. Katcher and his associates decided to investigate whether the human/companion-animal bond has benefits to human health, and if so, how best to use it to the advantage of both animals and society.

"Our research suggests that we should look to the health effects of pets in the mass of people who have no stigmatizing mental or social disability," says Katcher. In other words, the benefits of animals to the handicapped have been established. What we need to know is—are pets good for all of us?

Interesting findings are beginning to emerge. For instance, most people who have pets talk to them and believe their animals understand them to some degree. And while there is a slight rise in blood pressure whenever people talk to each other, there is no rise when they talk to their pets, which suggests some sort of soothing effect in talking to an uncritical, nonjudgmental creature. Observations of people stroking their pets could mean that animals provide an outlet for an innate need to touch and fondle. Men seem to fondle their pets as much as women do—could this be one of the few socially acceptable forms of caressing available to men? "Perhaps pets are not substitutes for human contact but offer a kind of relation-

ship that other human beings do not provide," Dr. Katcher says.

One member of the research group, social worker Jamie Quackenbush, counsels people at the veterinary school's clinic who need help making decisions about surgery or euthanasia for their pets, or whose pets have died. "What seems to hurt these folks most," says Quackenbush, "is people saying to them, 'Well, just be thankful it's only a dog.' Their love for the pet is trivialized. And to some, that dog may be the only friend they have in the world."

At Washington State University, the People-Pet Partnership Program was formed in 1979 under the guidance of the dean of the veterinary college, Leo K. Bustad, a longtime writer and speaker on the human/companion-animal bond. Members include faculty, students, townspeople and interested volunteers from the nearby University of Idaho. Firmly grounded in the community, the program conducts humane education, runs programs for bringing pets to the elderly, especially residents of nursing homes, conducts riding for the handicapped and plans to develop other programs for therapeutic uses of animals. "The recognition that people need to remain in close contact with the animal world for the sake of their own health, and the use of animals to provide this contact, have begun to be documented in this century," says Dr. Bustad.

It's possible that the findings of the University of Pennsylvania's research group will fascinate but not surprise those of us who are close to our pets. But they will perhaps give credibility and respectability to what many of us know in our bones.

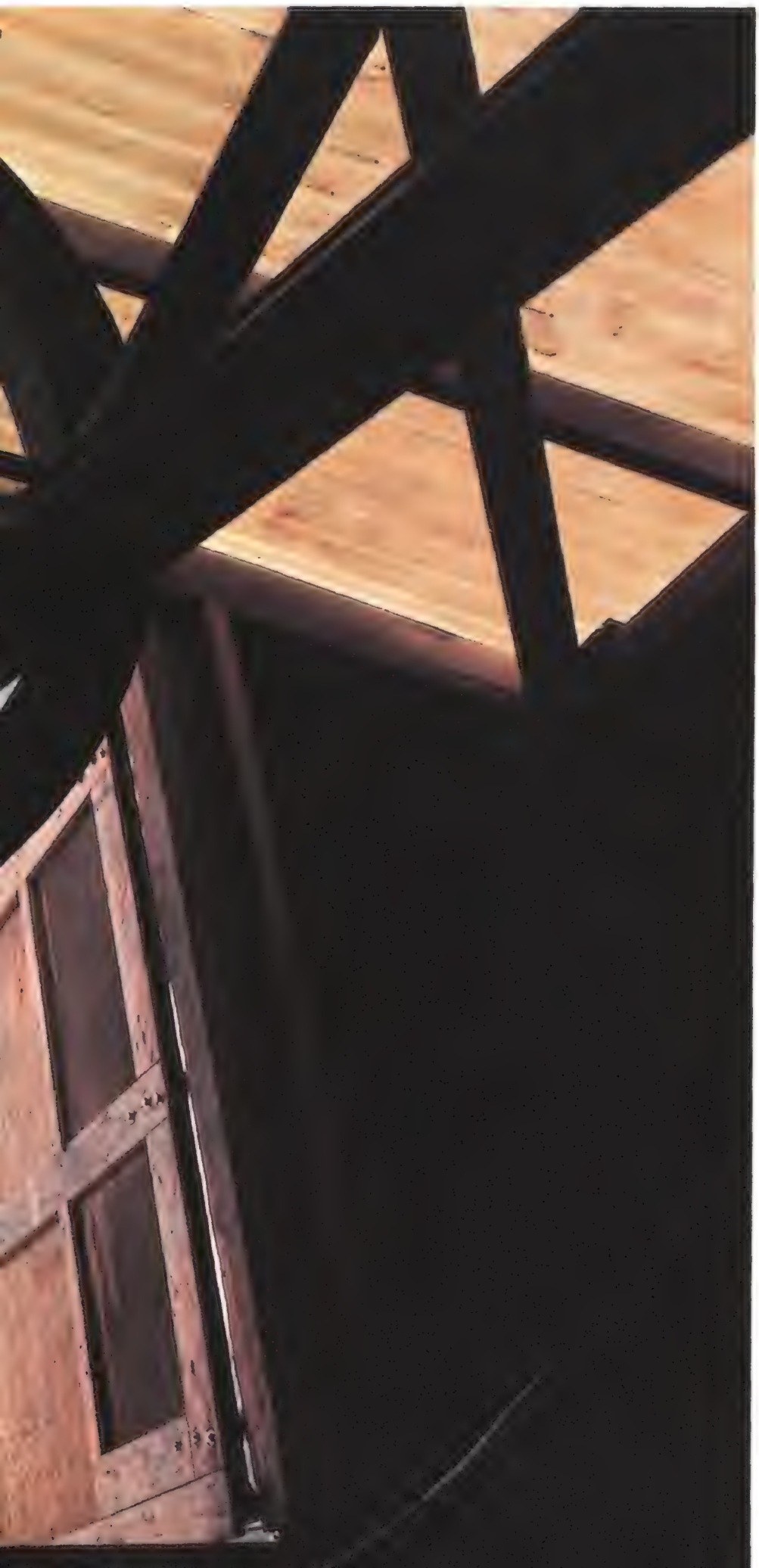
A patient at Lima nuzzles deer named Susie. Goose, Ronald, is named for superintendent Ronald Hubbard.

By Daniel Jack Chasan

Young astronomers, in search of an observatory, start their own

Photographs by Liane Enkelis

What began as a student dream ten years ago is now an independent research institute in California with a telescope and high hopes



Last summer, a biologist at a California university was explaining that he and some colleagues wanted to start their own small, independent research institute to free them, at least part-time, for their own work. It sounded like something of a pipe dream. Had anyone else done that? Yes, he said; there were the astronomers in Monterey who had got donations of money, equipment and professional services, built a telescope, talked the Forest Service out of a mountaintop in the Los Padres National Forest and started their own independent observatory.

A lot of people find the story of the Monterey astronomers inspiring, or at least something to smile about in the age of Big Science and big everything else. People would probably enjoy hearing about it even if it turned out to be fictitious, but it is absolutely real.

The Monterey Institute for Research in Astronomy (MIRA) began edging toward reality in Cleveland, Ohio, at the start of 1971. A group of astronomy students at Case Western Reserve University, soon to get their PhDs, were contemplating their vocational future, and they did not like what they saw.

The federal government had cut back its support for basic science, and job prospects weren't good. Even if

At their observatory site up on Chews Ridge, Cynthia and Nelson Irvine display architect's plan. Behind them, left to right, are other MIRA members: Bruce Weaver, Bob Bogardus, Hazel Ross and Craig Chester.

Opening doors of shed that temporarily houses telescope, Bob Bogardus inspects its open framework.

Nelson Irvine studies stars on classic photographic plates because, he quips, "electronics bewilder me."

Bruce Weaver decants liquid nitrogen to cool Reticon, used on telescope to detect 512 wavelengths of light.

one could find a job, the picture wasn't necessarily attractive. One of the students, a tall, bearded Tennessean named Albert Merville, had a very clear and unsettling image: "I could see myself becoming an astronomer—*the* astronomer, they wouldn't have two—at Podunk College, with no support for research. I would be in an astronomical wasteland, probably for the rest of my life." In addition, none of the astronomers relished the idea of working under the thumb of federal or university bureauracy. They all thought there should be a better way.

It was the time of the counterculture, when people were forming communes, moving to the country, planning to make their fortunes by raising earthworms. An idea began to take shape: they would form a kind of collective organization, an observatory independent of universities and the federal government, which they could support by a variety of schemes, perhaps even raising earthworms. That one expired quickly. The idea of the observatory did not.

At first, as the astronomers discussed the new observatory among themselves, they were careful not to tell the faculty of Warner and Swasey Observatory at Case Western Reserve. They assumed their idea would sound impractical, they thought the faculty would try to discourage them from carrying it out, and they feared the faculty would succeed. To this day, they don't know whether or not their professors knew what was going on.

When they finally had a firm idea of what they wanted to do, they gave the faculty a formal presentation. To their surprise, the professors liked it. Hazel Ross, who came to this country from Edinburgh to get her M.S., skipped it for a PhD, and stayed here. She remembers the day they told the faculty. It was the first time she knew that they were really part of an independent group with a life of its own.

If they were going to be astronomers, they needed a telescope and a place to use it. The heart of the telescope, a precisely ground 36-inch mirror, descended, if not from heaven, at least from NASA by way of Princeton University. The mirror, built as a backup for high-altitude balloon observations and never used, had in effect been gathering dust at the Princeton observatory. Carl Sagan had suggested that MIRA astronomers be invited to an American Astronomical Society meeting to give a presentation on their project. One morning during the meeting, Bruce Weaver joined the then director of the Princeton observatory, Martin Schwarzschild, at breakfast. They talked, and a few months later Schwarzschild offered to let the group use the mirror indefinitely. They were on their way.

Where they were on their way to remained to be settled. They wanted to put an observatory on a moun-

Daniel Jack Chasan, a frequent contributor, is author of The Water Link, *an economic, environmental history of Puget Sound, to be published this autumn.*

Working by red flashlight so as not to impair night vision, Nelson Irvine uses star chart to aim telescope.

tain somewhere with excellent atmospheric conditions and near a major observatory—with a library to consult and colleagues to talk with. Chile was attractive but impractical. The other good place seemed to be the mountains near Monterey. The Lick Observatory was just a little north, in Santa Cruz. More important, while the low-lying areas along the coast are notoriously foggy, the mountains above the inversion layer receive a smooth "laminar" flow of air from the Pacific. The night skies are dark and clear and there are few places on Earth where the atmosphere is less turbulent.

The site looked good on paper, but none of the astronomers in Cleveland had ever been there. So early in 1972, Merville, his wife and mother-in-law went camping in the Los Padres National Forest southeast of Monterey to get the lay of the land. Their first night there, Merville climbed into the car and drove along the steep dirt Forest Service roads—his mother-in-law worried about his safety in the dark—to a fire lookout on top of Chews Ridge, which they had selected as the most promising site. He got out and looked at the stars. He was hoping they wouldn't twinkle—twinkling may be nice for rhymes, but it indicates turbulence, which is bad for astronomical observing—and he wasn't disappointed. The stars stayed put until he looked within about 20 degrees of the horizon. It was a great spot. The astronomers decided to head for Monterey.

The following spring, they incorporated the nonprofit Monterey Institute for Research in Astronomy, and later that year, they started moving to the West Coast. It took nearly two years for them all to get there.

They still had to build a telescope, and they still had to support themselves somehow. They had already applied to the Forest Service for permission to build an observatory on Chews Ridge, and in 1974 their permit materialized. That same year, they got a $76,000 grant from the Research Corporation to build a telescope. Frank Melsheimer, who was the chief engineer at Lick, designed a telescope for them around the mirror, and his machinist brother Tom built it.

When they needed a road to their observatory site, they talked an Army Engineers battalion at nearby Fort Ord into building one as a summer training project. They also needed plans for the observatory. A lawyer who was taking an astronomy course from Merville turned out to have a brother in Los Angeles who was also interested in astronomy, and the brother turned out to be an architect. The brother, Lawrence Bernstein, who had studied with Frank Lloyd Wright, liked what the MIRA group was trying to do, and drew—for free—an innovative set of plans.

Another thing they needed was a library. Bart Bok of the University of Arizona, past president of the American Astronomical Society, had met the MIRA astronomers when they were still in Cleveland. His late wife, Priscilla Bok, who was also an astronomer, had an idea for starting MIRA's library: give them the astronomy books and journals the Boks had collected over more than 25 years.

Meanwhile all the MIRA astronomers had to earn a living. Some work at designing computer software and performing other technical tasks in the extensive local military-industrial complex. Others teach—at the Naval Postgraduate School in Monterey, at commu-

Sliding shed roof back, Bob Bogardus pulls it along its tracks to expose 36-inch telescope (at far left).

Independent astronomers

nity colleges, in public school enrichment programs, at Soledad state prison.

Actually, Weaver says, all the MIRA astronomers have been doing not two but at least three things: supporting themselves, working on astronomy and trying to build what they consider a major observatory.

Originally, they had hoped the observatory would be built by 1976. But they still hadn't raised enough money for the building when their telescope was completed in 1977, so they installed it in a "miniature observatory," actually a shed behind a private home in the Cachagua Valley, where they have made some preliminary observations. More important, they've been developing the computer control for the telescope and they've been building and testing very complex electronic instruments that will be used with it.

The instruments have been devised in the MIRA office, located off a narrow winding street above a bare dirt parking lot on the ground floor of a pinkish, two-story building that might generously be described as "unprepossessing." There is no identifying sign. Inside, behind a pair of plain wooden doors, one finds a jumble of equipment. The beige metal box of a HEX minicomputer with its video screen and keyboard stands on a plywood shelf. Rolls of electrical wire rest on the floor. Working surfaces are covered with wires, circuit boards, papers.

When the telescope instruments are being worked on, an irregular blue metal box hangs from a framework of two-by-fours, undignified by cross-bracing, in the center of the room. The blue box (a spectrophotometer) is the principal one of several instruments that will be simultaneously mounted on the 36-inch telescope. Light collected by the telescope enters from the top of the instrument. It is guided down to a prism or grating, which breaks it up into a spectrum. Traveling through one of two cameras, the diffracted light then strikes the heart of the instrument where an array of 512 photoelectric diodes (a Reticon) responds to light of 512 different wavelengths. The light hitting each diode is converted to electric current, which then travels to the computer. The computer prints out a graph that shows the intensity of light at each wavelength.

The computer will do a great deal—not just processing and storing information, but also controlling the movement of the telescope, much more precisely and quickly than it could be guided by hand. Chester explains that the Reticon and the computer control are complementary when observing bright stars. If one were using traditional photographic plates, the speed of computer control would be irrelevant. With plates, "exposure can take an hour, an hour and a half," he says. "So if it takes two minutes to move the telescope, who cares? With the Reticon, the exposure time is only one minute, so if it takes two minutes to move the telescope," you're spending only one-third of your time observing.

Weaver and Chester, who have done a lot of the work on the instruments, are very much at home with them. Chester is clearly pleased to explain that the Reticon is off-the-shelf technology sold for industrial use and it wasn't really suitable for their purposes until "we threw out their electronics and put in our own." Ross says, on the other hand, that she doesn't really care how the intruments work; all that interests her is the information they produce. Nelson Irvine goes out of his way to point out that photographic plates still have an important place in astronomy; and as he uneasily pries a chip out of a microcomputer, he says, "I'm an advocate of photographic plates because electronics bewilder me."

Stargazing in front of a TV screen

That tongue-in-cheek statement is not, however, a plug for the good old days. Irvine concedes that "the picture of a 1920s astronomer looking through a huge telescope in a freezing dome, all bundled up, is more romantic than that of a comfortable modern astronomer sitting in a chair with a cup of coffee and looking at a TV screen." But, he says, the important thing is not the romance but the data.

Actually, there is more than a little romance—certainly more than a little contrast with the electronics—in MIRA's history and in MIRA's current site for storing and using its 36-inch telescope.

One drives to the telescope up alarmingly winding roads through the hills southeast of Monterey. They are classical California coastal hills, covered with tawny grass and the heavy green of live oaks. One turns off the paved road onto a long dirt driveway up which a deer or bobcat is occasionally seen strolling.

MIRA astronomers, and some of their worldly-wise friends, plan fund raising to meet a $200,000 challenge grant. Astronomer Bart Bok (right) and his late wife gave MIRA their own library of books, journals.

The shed in which the telescope stands has plywood walls and a peaked fiber-glass roof; entering it, one might expect to find a Rototiller and a few bales of hay, or perhaps a 1948 Ford up on blocks.

What one finds is six tons of precisely fashioned steel. The business portion of the telescope rests on what appears to be a massive green tuning fork, rising at an angle from the concrete floor. There is no tube from the aperture of the telescope to the big mirror, just an open framework of heavy tubular bracing. A black baffle extending down from the aperture prevents stray light from entering.

To move the telescope from its fixed position, one first starts a small air compressor clattering in the corner, then manually unscrews the clamps that fasten the top half of the building to the bottom, then manually shoves the top half, which rests on rollers, back onto a framework of weathered gray boards.

Once the roof has been shoved back and the clattering compressor has built up enough pressure, the funkiness recedes: the movements of the telescope are swift and precise. As Nelson Irvine moves it about, a little hiss of compressed air following each movement, he explains that it isn't moving at full speed, and says with some pride that "when this thing moves at full speed, it's a lethal weapon."

The MIRA people are eager to see their telescope installed in grander quarters. On a wall of the MIRA inner office—where the library resides in piles and boxes and on Sears metal shelves—hang Bernstein's drawings of a real observatory complete with control room, sleeping quarters and a sliding roof one doesn't have to push.

Once the observatory is actually built, the MIRA group can get on with its main astronomical project, which will involve observing and classifying some 125,000 stars over a period of five years. The science of astronomy depends heavily on catalogs of stars. One of the catalogs is the Henry Draper, which was compiled under the auspices of Harvard University in the early decades of this century. The Draper catalog includes 250,000 of the brightest stars that can be seen from the northern and southern hemispheres. MIRA wants to use its sophisticated equipment to observe and reclassify the northern hemisphere stars.

Chester suggests that MIRA is uniquely well qualified to do the Henry Draper survey for reasons he describes as both technological and "sociological." Technologically, he says, the speed of the telescope and the data processing will allow the whole huge task to be completed in one place over a manageable length of time. Sociologically, the lack of university pressure to "publish or perish" gives the astronomers the freedom to undertake a project that may produce no significant papers for five years.

Some of the astronomers felt they needed a big proj-

The Irvines alternate child care and telescope time; here, Cynthia lets daughter Alice peek into telescope.

ect that would be useful enough and firmly enough in the mainstream to gain them the support of the astronomical community. The Henry Draper survey seemed to fill the bill. So far, it has done so. The astronomical community is certainly behind them, although clearly not just because of that choice.

As the action in astronomy has shifted more and more toward quasars, pulsars and an array of other phenomena relatively far removed from the study of bright stars, the MIRA astronomers have conceived of other projects for which their telescope and instrumentation are particularly suited. Astronomers from other institutions have already been attracted to MIRA's unique resources. One group plans to conduct a search for extragalactic supernovae using the MIRA telescope. Preliminary observations will begin this fall, and when the supernova patrol is in full operation several thousand galaxies can be observed in a single night.

In working on the Henry Draper survey, the MIRA astronomers know they will not be focusing on the most glamorous area of their science. They are not apologetic. They say that the survey will be of significant, lasting value to astronomy, and that once they begin the seemingly mundane work of cataloguing, there will almost certainly be surprises. "It's the oddball stars that are interesting," Chester says, explaining that by "oddball" he means stars that are passing through relatively brief and seldom-observed phases of development; someplace among the 125,000 northern Henry Draper stars, he expects to find an appreciable number of them.

Merville goes beyond that. He theorizes that just as one's thought processes are partly determined by the language in which one thinks, so an astronomer's view of the universe is determined at least partly by the ways in which the stars have been classified by the great catalogs. The Draper catalog groups the stars in categories that were determined by the photographic technology of 1900. The main effort to update it created new categories based on the photographic technology of 1940. If the MIRA study, based on a different, more sophisticated technology, creates new categories, it will also create a new way of thinking about the stars.

Astronomers in search of a patron

To finance the study—and the building of the observatory and everything else they want to do—the MIRA astronomers will have to persuade private citizens to fund them. The promise of the observatory building seems within reach now. In December 1980, Dr. Bernard Oliver, a vice president at Hewlett-Packard Corporation, offered MIRA a personal $200,000 challenge grant for the observatory building—if the young astronomers could raise the funds to match his gift within one year.

Others have supported the astronomers by joining a group called "Friends of MIRA." Some others have not, Chester says, because the large sum needed to build the observatory—current estimates are on the order of $500,000—discourages people who don't have a lot of money to give. "People see so many zeros and imagine more than they see and assume their contribution won't matter," he says. "But if you get $1,000 from 100 people—or $100 from 1,000 people—that's a lot of money."

The group also hopes to find someone who can give them a single large sum which will endow the institution. That isn't a new idea. Many older observatories bear people's names because those people put up the money. The Yerkes Observatory, for example, was bankrolled by and named after a Chicago streetcar magnate. The Lick Observatory was funded by and named after a California land developer, James Lick,

who is buried in a telescope pier. MIRA hopes that somewhere, out there, is another James Lick.

It has been a long haul, much longer than any of the astronomers expected. Despite the delays and the inevitable frustrations, "they have held together with all the original people," notes Bok, who has kept up what he calls "an exceedingly pleasant association" with them. "That is to my mind one of the most amazing things. What I was most afraid of was that after two or three years, the original group would start to evaporate."

Not that the confidence of individual MIRA members hasn't wavered from time to time. They have got depressed. But they have never all become depressed at once, and the majority of the group has always managed to cheer up the member or members who have felt glum.

One reason why they haven't grown discouraged, Cynthia Irvine suggests, is that they have had supporters like Bok, like Schwarzschild, like Art Hoag, the director of the Lowell Observatory who, when he was visiting relatives in Los Angeles, more than 300 road miles to the south, just happened to drop by Monterey with a van full of professional journals for their library. "We have confidence," she says, "because other people have had confidence in us."

MIRA's telescope takes look at stars of northern hemisphere (seen as streaks in this time exposure); the planned five-year survey will involve observing and classifying about 125,000 stars of Draper catalog.

By Henry Mitchell

An Oriental garden grows, elegantly, in mid-Manhattan

The Metropolitan Museum adds a jewel that has been painstakingly modeled after a centuries-old Chinese courtyard

Complementary juxtaposition of sunlight and shade, all carefully planned, is part of courtyard essence.

If it's not too gross to say so, the new Astor Court of the Metropolitan Museum in New York is a tail that wags the dog; a supertail that wags a lovely dog, for in theory the garden court merely leads to a gallery of fine household furniture of the Ming period (1368-1644), but in fact the garden is itself a masterpiece that probably will have far more effect on American culture than the galleries it leads to.

Nothing could be more Chinese than this garden, which is not surprising since it is virtually copied from a little court in the Garden of the Master of the Fishing Nets in Suzhou, near Shanghai (opposite). And nothing could be more different, mercifully, from the caricatures of Chinese design that have appeared in the West for the past 300 years.

The size of the court, 40 by 59 feet, is modest enough to inspire close attention from Americans who suddenly find themselves with tiny pieces of land to live and garden on. Beyond that, the time is ripe, the time is perfect, for a superbly executed Chinese garden in one of the world's major museums to give horizons and directions to an American taste that is tired of the machine and all its works, bored with steel and glass, and, God save us all, becoming fed up with fake wood, fake glass, fake everything.

What may be called the Granny Earth movement is already strong among the young who tramp the forests with their astonishing shoes and back gear as they search for some greater sustenance from nature than they have found in society. But even the old—we who are past 26—forecast the trend decades ago. Culture does not consist of trendy babble but of natural proportions deeply sensed, carefully brooded over and at least halfway realized.

If only one thing is certain in American culture today, it's this: people want it real rather than fancy, and—perhaps for the first time on any large scale in our history—we want to get away from, rather than to join, the unrewarding glitter of big cars, mansions, Las Vegas, Newport and genuine hand-painted landscapes in 24-count-'em-carat gilded frames.

Only at such a stage of American consciousness

Photographs by Seth Joel

Zhang Xiushen/China Pictorial

Suzhou garden courtyard, first built in 12th century, inspired the Metropolitan's graceful Astor Court.

could the Chinese theory of gardening make any appeal or have any influence. Until the mind is ready, the eye will see nothing in a Sung landscape or a Korean rice bowl or a Chinese courtyard. But now the time is not merely ready for the Chinese modesty, splendor and grace to be noticed, but ripe for it to be profoundly felt.

In the West we have always wondered why Chinese gardens have so few flowers in them and why, from the world's greatest treasure-house of superb native garden plants, the Chinese have selected only the scantiest handful to cultivate at all. The reason is not far to seek. Cities were and are congested, and the Chinese notion was that everyone who could possibly manage it should of course have his own garden. The demand on space is obvious.

Equally obvious, if you immemorially insist, as the Chinese did, on low dwellings with endless windows and doors, you wind up not with a house and garden but with a piece of land through which the house and its walkways and pavilions thread like a domesticated dragon, leaving you with patches of outdoor space often no larger than the rooms, and invariably bounded by walls.

These outdoor spaces, which we understandably call gardens, were of necessity shaded much of the day, and no spot in them is more than a few feet from some room of the house.

Even in the West, as you may see in the gardens of ancient Pompeii or at the Alhambra in Spain or in the medieval cloisters of France, precious outdoor space dominated on all sides by architecture results in highly stylized, highly "man-made" gardens.

In the Astor Court, you have only to take away the elaborate (if understated) pavement of gray terra-cotta bricks set on edge in a basket weave, or the cut-stone base of the long raised walk, or the openwork grilles in the walls, or the endlessly complex roofing of the walk and the Ming Room, or the highly artificial and self-

Henry Mitchell's features and columns on people and gardening appear regularly in the Washington Post.

A Ming garden in Manhattan

Elaborate window in rear of Ming Room frames another work of art, view of bamboo and Taihu rock.

Handles on Ming Room doors represent fish, symbols of freedom and harmony and talismans against evil.

conscious placement of the rocks (themselves chosen for a byzantine complexity of outline) to see that nothing would be left if these sophisticated artifacts were removed.

And yet the Chinese revere nature and, as their art has reflected through so many centuries, are lost in wonder at wild crags, deep gorges, untamed forests. They learned, perhaps better and certainly sooner than in Europe, that merely padding across a courtyard from one room to another in the house is not satisfying, so they did not blush to use geometric walks.

The Garden of the Master of the Fishing Nets dates as we know it only from the end of the 18th century, and even that design has been modified here and there well into our present century. It was first built, however, in the 1100s and thus is old indeed.

Through the centuries the garden fell into ruin, was rebuilt, changed, rebuilt again. In its simplicity and superb workmanship, the design of the Astor Court suggests a garden much older than the end of the 18th century.

One enters the Metropolitan Museum's reconstruction through a moon gateway in the south wall of the court. One does not start immediately down the walk along the east wall to the north gallery.

Instead, there is a right-angle turn to one's right, then a right-angle turn to one's left before one is on the covered walk. From the moon gate, the view extends all the way to the north, but there are seven variations in sunlight and shadow along this vista. There is a dark vestibule, then the light of the court, then a jog (a geometrical jog, for this walk does not meander about like a cow) in which the walkway roof makes a patch of shade. Then a little strip in which the gray terra-cotta walk railings, rubbed with carborundum, catch the light, then the dark of the Ming furniture gallery, then a patch of brilliant light as the gallery's far wall is pierced by fretted windows (left) through which one sees a rugged rock, a bit of bamboo and a seemingly distant white plaster wall.

The spell of light against dark

The essence, though not the detail, of the garden is seen fully in one's first glimpse. The sense of space is achieved through rhythms of alternating light and dark and with no flashy elements introduced to break the spell.

There are 50 wooden pillars in this Ming portion of the museum, the soft tobacco-brown *nan* wood that has always been sought for its resistance to decay and to insects. It has become so rare that it is no longer available for ordinary projects, but is reserved now for uses such as the Memorial Hall in honor of Chairman Mao, and this court.

Chinese workman lays handmade bricks from imperial kiln in pattern described in a 17th-century manual.

At the right, workman shapes pieces of Taihu rock, already eroded by sand and water at lake bottom.

It is only gradually that you notice how beautifully the posts match, how beautifully they stand on their little stone bases, how splendid the joinery is where they meet the roof, and how subtle the rubbed finish is. The walk itself sits on a granite base but the balustrade is of gray terra-cotta that one at first mistakes for soapstone.

One turns 90 degrees to reach the entrance of the north gallery. Its walls are overhung by a beautiful tiled roof and, thus sheltered from weather, are composed of delicate fretwork panels that can be folded back on their brass hinges, exposing the Ming furniture gallery completely to the open courtyard.

In front of this gallery, at the north end of the court, is a little terrace of granite, sharply cut but subtly grooved by the stonemason's tools. It is very finished, very formal. But you step down from it by means of a natural weathered boulder.

Then you are on the tiled floor of the court itself. This terrace, in the Suzhou garden, was fine for viewing the moon, but in New York the courtyard is covered by a vast glass roof, fortunately so high above the garden that it becomes invisible.

Along the west wall, opposite the covered walk, the unadorned white plaster wall is interrupted for a half-pavilion, roofed with tile and supported by joinery of great sophistication and strength. The terra-cotta benches here have curved back rests of ginkgo wood, attached to the *nan*-wood posts of the pavilion by long metal hooks. Each element here, as elsewhere, is unobtrusive, crafted with a jeweler's finesse.

Looking back toward the south wall of the court, you see grilles giving glimpses of bamboo beyond. They look for all the world like Chippendale woodwork. All the tiles of this court came from the Lumu imperial kiln that produced the tiles for the imperial palace until the end of the 18th century. This kiln had been closed, but was opened and set into production for this courtyard by the People's Republic, which also made available the *nan* wood and, by no means least important, the highly skilled Chinese workmen who came to New York to build the garden.

Mrs. Vincent Astor, the former Brooke Russell, spent some time as a child in Peking and fell in love with the courtyard of the old house her family lived in. The museum decided, early in the 1970s, to augment its Far Eastern collections. Mrs. Astor, a trustee of the museum, thought a garden courtyard might do much to convey the spirit of Chinese art. Without fanfare, the court strongly affects the visitor approaching the exhibit galleries.

The project cost several millions, and the museum has publicly commented on the extraordinary generosity of Brooke Astor. Apart from the inevitable and obvious cost of rare woods, tiles, labor and research traveling, several things swelled the eventual bill. First, there was a determination by the museum and Mrs. Astor that if the thing were to be done at all, it should be done authentically.

This involved the most careful planning and research with Chinese authorities, and indeed the courtyard was first erected in a park in Suzhou, and its parts duplicated for eventual assembly in New York.

Twenty-seven Chinese came to New York to fit the

Interior of Ming Room is a space of meditative calm and showplace for museum's prize Ming furniture.

pieces together, adjusting a 32nd of an inch here, a quarter-inch there, as they worked.

They used their traditional methods. Wooden tripods were used to shift the great rocks, each weighing a ton or so. The tiles were cut by handsaw. Traditional mortars were used. For the black finish on the ribs of the upward-curved pavilion roof, it was not a question of slopping on a bit of black paint. Everything appeared to involve grinding things in mortars, cooking them in kettles, and applying them with the deliberation of medieval monks copying the Bible.

An effect nearly the same could have been achieved with black paint. Nearly, but not quite. The magic of the garden owes much to slight refinements. Where rugged boulders meet the blue-gray pavement tiles, it would have been simpler to set the boulders on top of the established pavement. Instead, each tile is precisely cut to meet the rough stone, which is set down into the tile.

Commercial unglazed gray tiles would have given nearly the same effect as the ones used in the court, but again not quite. The color is the result of firing the tiles with rice hulls, and while they are still warm, spraying water into the kiln, changing the normal terra-cotta color to soft gray.

Again, it would have saved expense if the hand railing of terra-cotta merely stopped when it met a wooden post, then continued anew on the other side. Instead, the railing is continuous and each wood post is completely encircled by it.

Once the design was decided and the prototype had been erected in China, New York workmen could have assembled the elements after they were shipped to the museum. More or less.

It cost more, needless to say, to send so many craftsmen from China to New York, where they were put up at a hotel. Their own cook came with them, and food was prepared in the museum. There was no way the Chinese craftsmen could fend for themselves at New York restaurants without knowing the language, the currency or, for that matter, the odd menus of us Americans—although they did develop a taste for hot dogs.

Brooke Astor arranged for the workmen to see a circus and other sights in their off hours in New York, and paid for all of them to visit Washington, where they examined the stonework (and made polite comments about it) of the capital's monuments. One workman ran his hand beneath a stone bench to see if the stone was carefully finished there, as well as on top. He may have been disappointed.

The Astor Court was never intended to be a casual pretty courtyard in the Chinese style, but one correct in every feasible detail. Which brings us to the white-painted plaster walls.

The Chinese craftsmen wanted to build the traditional brick wall, coated with lime plaster and properly finished with rubbed beeswax—an astonishing formula, and far more complicated than mere whitewash.

But engineers distrusted the weight of the wall (the courtyard is on the museum's second floor) and so aluminum and wire coated with plaster were used. And since visitors will throng through the court every day, paint was felt a more practical finish than the impermanent, unwashable beeswax that attracts fingerprints like dragonflies. One might disagree, until (if the Chinese finish had been used) one went to see the garden and found it closed for refinishing.

A retreat from the noisy world

In China, gardens of this sort are never for the display of wealth. A Chinese garden may cost a fortune, but it is not gaudy or opulent. It is valued as a retreat from the noisy world, or the pressures of government affairs, a spot in which one may think, or meditate, or come close to nature, or create a poem, a painting, calligraphy.

The Chinese have a passion for rocks, preferably huge boulders that have weathered under water, as in Lake Tai (where the Astor Court rocks come from). They suggest wild mountains. If they have holes all the way through them, so much the better. But one has only to look at a few dozen examples of Chinese garden rocks to see, as the Chinese do, that some are more beautiful than others.

A quite fine rock is sited against the south wall of the court. Western eyes may find it distracting, with fretwork grilles behind it. Any Western eye would prefer it against a plain surface, and it is perhaps the

"We got this oil by cooking rocks."

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"The oil shale is mined 800 feet down."

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"The liquid is shale oil. The rock is oil shale."

only aspect of the garden that seems to us to be deliberately wrong.

Water is a feature of all Chinese gardens; in fact, rocks and water are indispensable. Here a shallow informal pool, edged with natural rocks, lies to the south of the pavilion.

Chinese gardens, contrary to Western notions about them, are full of geometrical shapes. But within a framework so abounding in the carpenter's and mason's efforts, water is treated informally. The great thing about water is that it shapes itself to the land around it, and the Chinese almost never see any point in settling so limpid a substance in circular or rectangular confinement. Their pavement tiles, their walkways, are geometrical—but not their pools nor, of course, the jagged rocks used as sculpture.

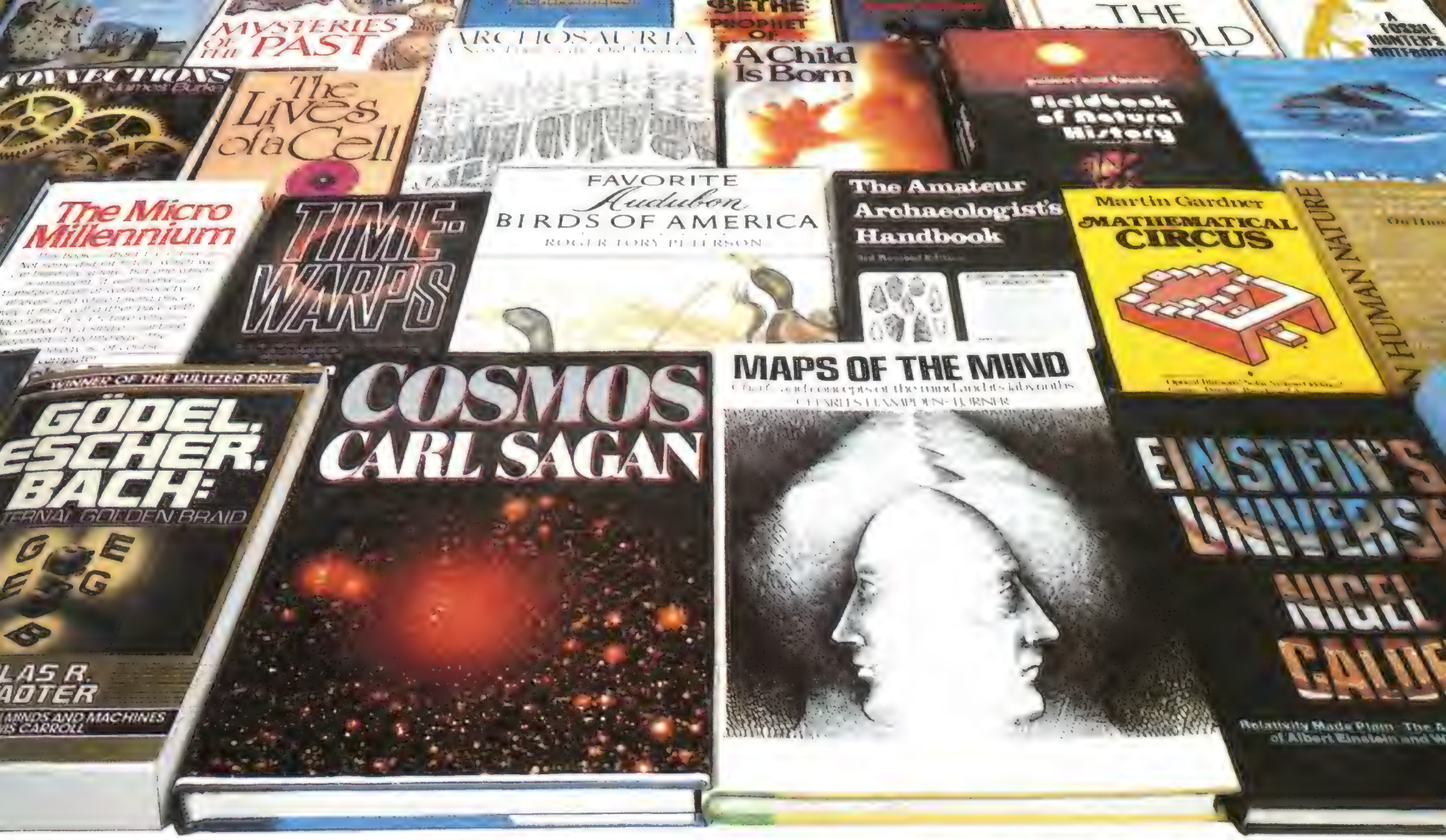
Except in nursery gardens, where flowers are grown merely for examining one by one (as in a collection of peonies), plants are used informally, too. No rectangular beds or trees in rows. The Chinese want their gardens to remind them of wild nature herself. They may prune a tree within an inch of its life, but only to show off its wild beauty. They have nothing to do with shrubs clipped like puddings.

In this garden there are few plants indeed. A tuft or two of lilyturf (*Ophiopogon japonica*) and a crape myrtle, a juniper and a few feathery bamboos, a banana, a pine, and that's about it. Even if the court were jammed solid with flowers, there could not be many in so small a space. The Chinese learned early that sparseness commonly increases the effect or illusion of luxuriance.

In the unnatural and quite difficult environment of a glass-roofed New York court, pots will occasionally be brought in for a little color. Not too much, one trusts. But a few azaleas, chrysanthemums, cherries, apricots, quinces, narcissus, peonies and lotuses will appear in their seasons.

Restraint without dullness, elaboration without fussiness, harmony without mechanical triteness—these are among the lessons of the garden. If there is nothing here that is giddy and arty, there is also nothing that is ponderously solemn. There is balance, reason, imagination, flair. As priceless in the West as in the East.

The courtyard's half-pavilion has a channeled roof which, if it were outside, would part rain into streams, turning a shower into a curtain of coruscating water. Curved bench back is called Beautiful Lady balustrade.



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Q: Are modern computers as smart as any living animal?

A: Today we have machines with the intelligence of the earwig, a tiny insect. This may not seem much, until you realize it took evolution millions of centuries to make the same leap. *(See The Micro Millennium.)*

Q: Can time speed up and slow down?

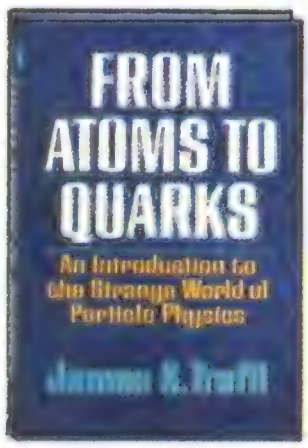
A: Yes, by the theory of relativity. Consider two twins. One leaves Earth in a spaceship, travels close to the speed of light, and returns. Although he's only a few weeks older he's astonished to find that Earth has aged hundreds of years. His twin brother, and everyone he knew, is long since gone. *(See Einstein's Universe.)*

Q: Most important brain functions are represented in both the right and left halves. But which vital function is only found on one side?

A: Speech. There are three speech areas in the brain, but in the vast majority of people they are all on the left side. *(See The Origin of Consciousness in the Breakdown of the Bicameral Mind.)*

Q: What seemingly unrelated invention was one of the main causes of the separation of classes in the Middle Ages?

A: The chimney. Before its invention, people of all classes had to mingle in the same room around an open fire. The chimney enabled heat to be distributed to different rooms, encouraging class separation. *(See Connections.)*



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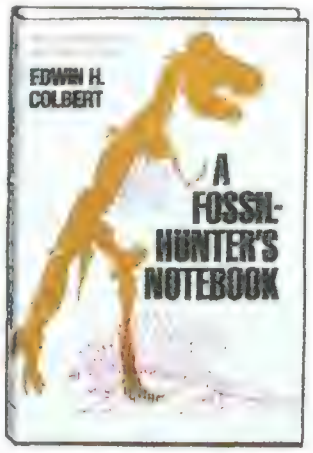

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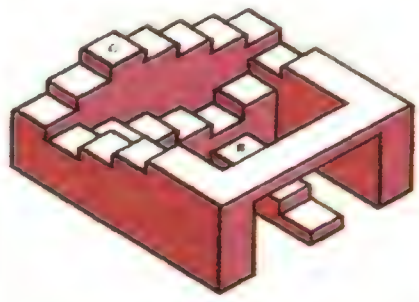

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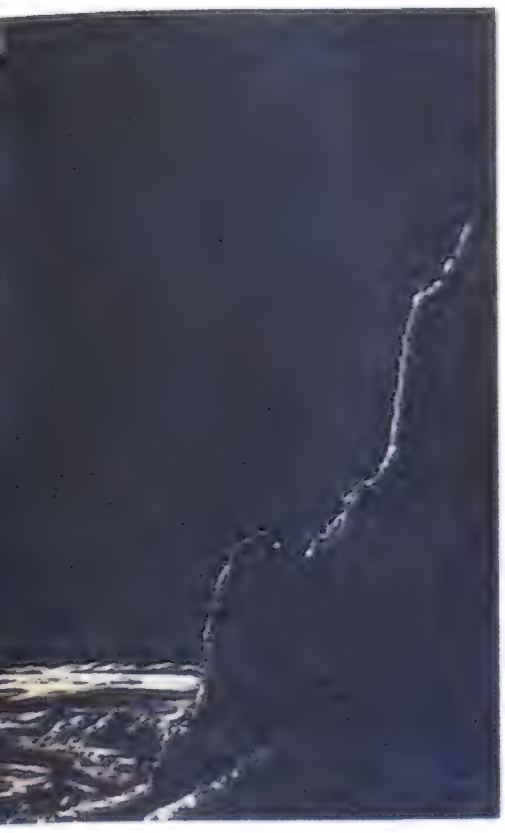

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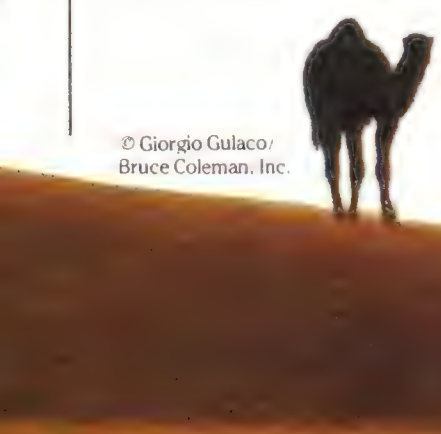

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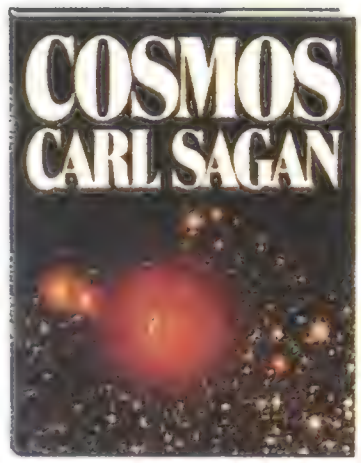

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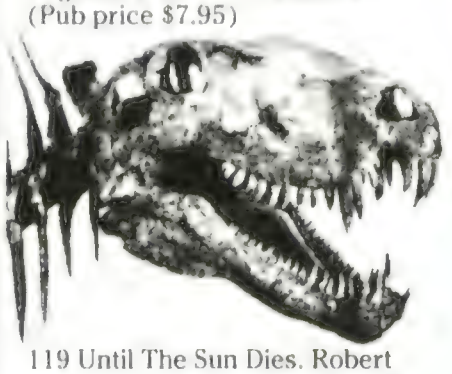

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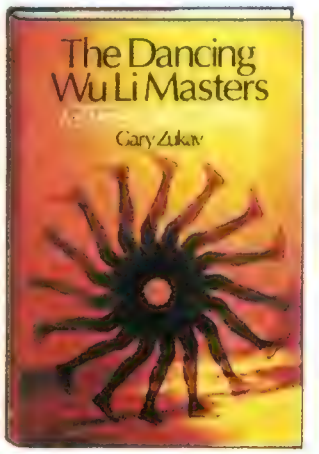

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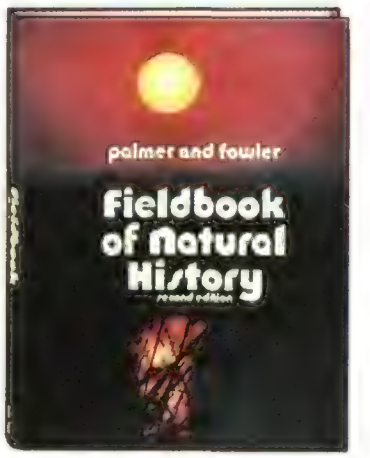

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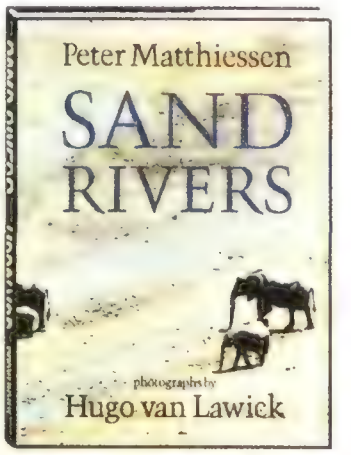

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WHERE THE WONDER IS

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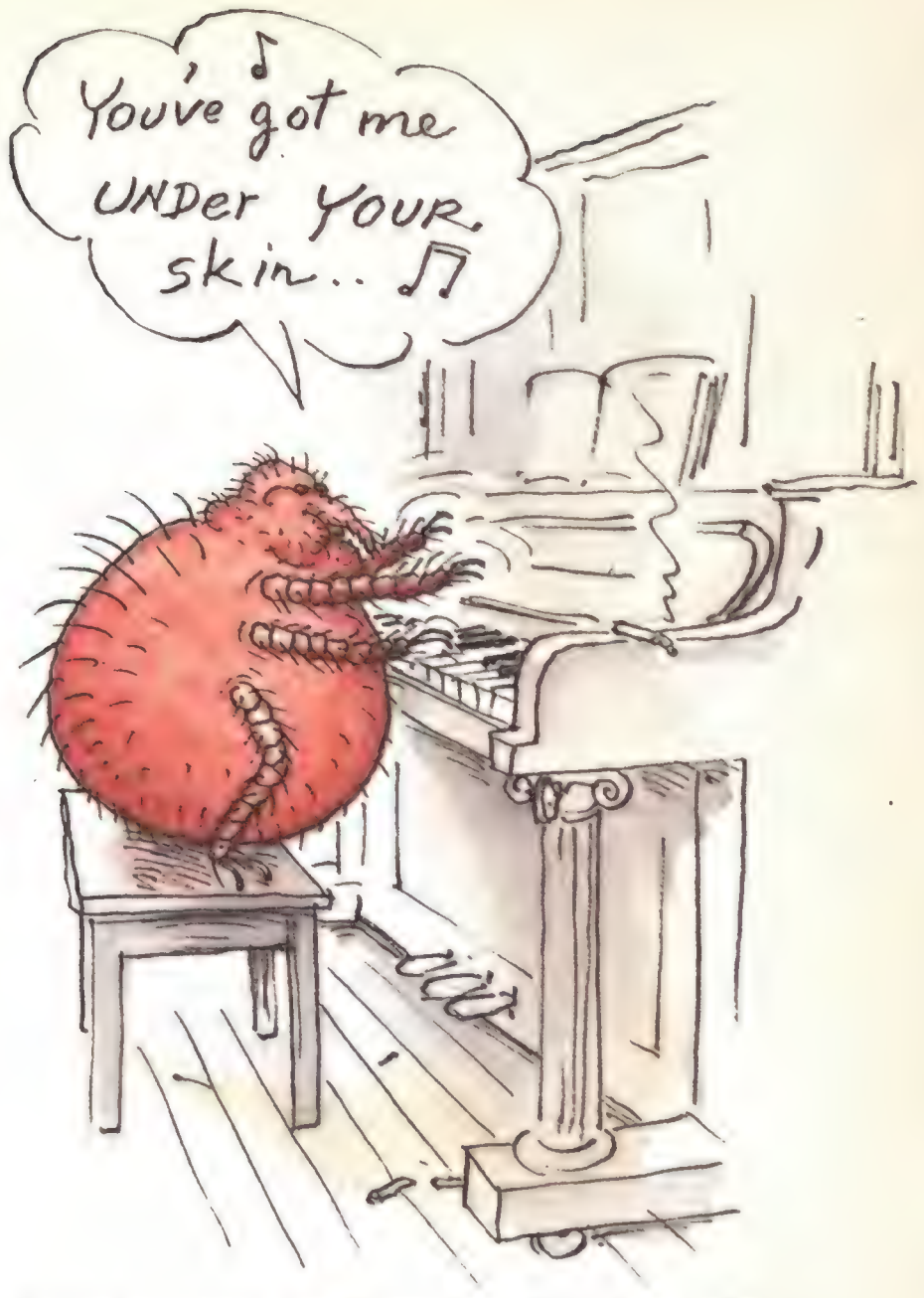
By E. F. Rivinus

Chigger season: mythical mite behind the itch

Forget the nail polish and well-meant advice: here's the true story of a summer scourge and what you can do about it



Actually, it's not the chigger but a "drinking tube" it leaves in our skin that causes us the most trouble.

I scratched my first chigger bites on Louisiana maneuvers in 1941, have renewed the association regularly over the ensuing years in Maryland, Virginia and West Virginia, and extended it to Costa Rica, Panama and Heidelberg, Germany. The chigger doesn't seem to bother everybody, but for many years now it's had top billing among the itches in my life.

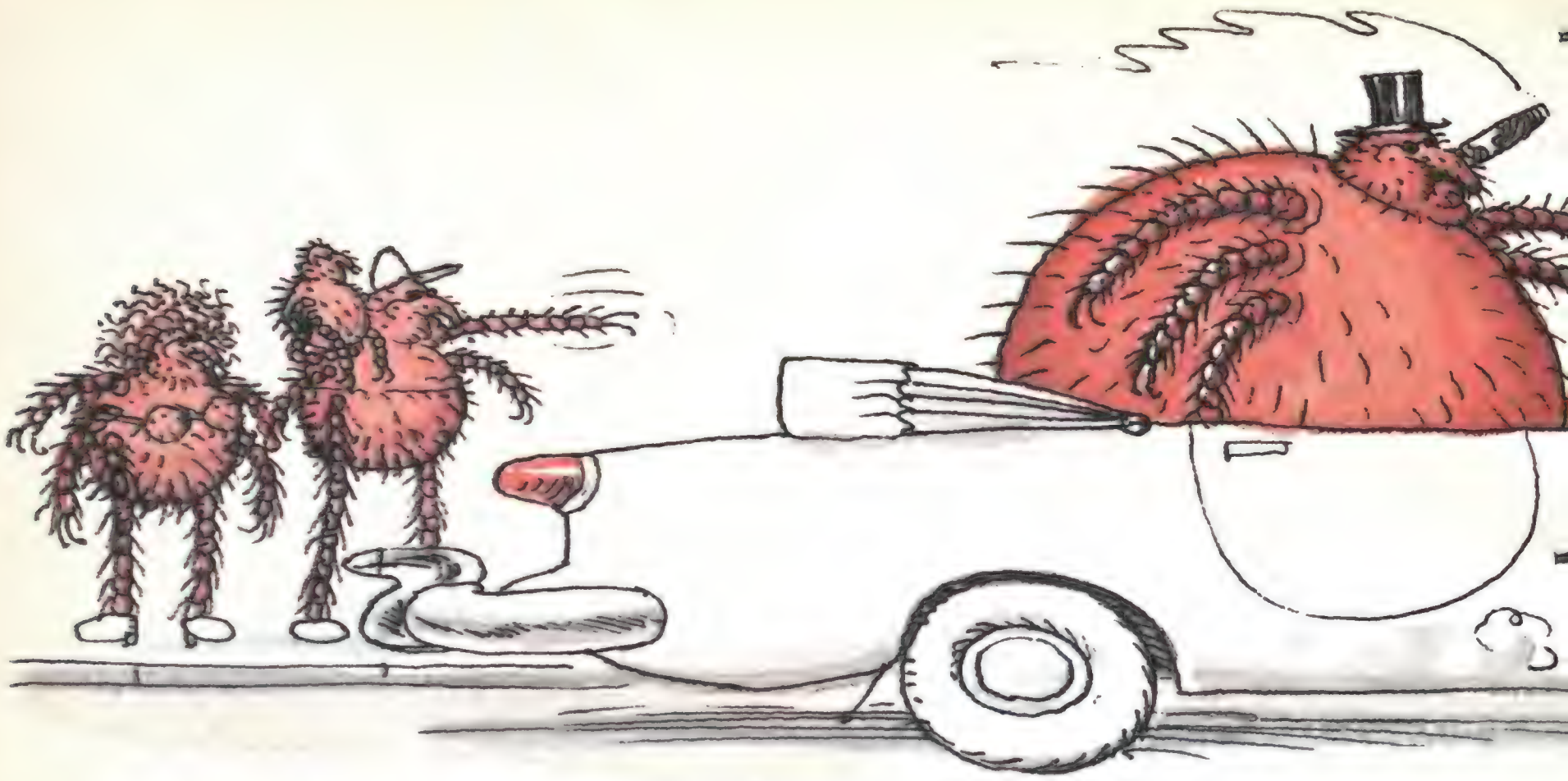
Of course, my first interest in the chigger was one I shared with my army associates: What to do about them? How to relieve chigger bites? And how to prevent them? We got a world of information from local people, and self-styled experts from farther afield (an army is always full of "experts"), but most of it proved worthless. The mythology about chiggers proved to be so widespread that my curiosity was aroused. What was this "bug" that reportedly burrowed under my skin, drank my blood, and could best be dispatched by putting a dab of nail polish on the welt? That's still the most popular explanation of the chigger and how to deal with it, sometimes repeated by "authorities" who ought to know better. All of it is inaccurate and much of it is just plain wrong, but it took a lot of delving to find that out.

I found, for example, that the chigger is not an insect. It's the larval stage of a mite. Mites are Acari (of which there are unbelievable numbers of both individuals and species) and thus studied by acarologists—who are a category of scientists quite distinct from entomologists, the people who study insects.

I learned that the chigger doesn't burrow under your skin, and it doesn't drink your blood. And I learned that the itch from a chigger bite comes not directly from the creature itself as much as from a kind of tube or drinking straw, which is developed at least in part by your skin in reaction to chigger saliva, and through which the chigger sucks up the skin cells which it does eat. That tube, known as a stylostome, stays long after the chigger has departed. Your skin continues to react against it, itching in the process, and that will go on until the stylostome is finally absorbed by your body a week to ten days later. And I learned that out of the thousands of species of Acari, only a few produce larvae which are parasitic and that even to those few, Man is a pretty unsatisfactory host. Take what comfort you can from that, next time you find yourself scratching.

Over the next few years, though, I ran into more and more people who parroted the old mythology every time they scratched a chigger welt. So I dusted off my notes and sent them to Dr. Frank J. Radovsky of the Bernice P. Bishop Museum in Honolulu, whom entomologist friends at the Smithsonian had recom-

Illustrations by Michael Ramus



An engorged chigger, assured of reaching the next stage of its life cycle, must be the envy of its companions.

mended as a leading acarologist. He and Dr. M. Lee Goff, who is not only an acarologist but has a particular focus on chiggers, pointed out a number of errors and misinterpretations in my research and recommended a bibliography.

I learned a lot. To begin with, two facts have led me to personal conclusions about chigger behavior (which not every scientist may share). First, there's no love in a chigger's life. The male and female never make any direct, much less affectionate, contact. When he feels the urge, the male simply deposits a cup-shaped stalked packet of sperm on the ground. A female finding it, and feeling the urge in her turn, opens a sort of genital bomb bay, and picks up the packet without thought for its author. Because there's also no mother-child relationship among these animals, it's obviously inappropriate to expect them to show a mite of compassion toward their hosts.

Secondly, the adult mite into which the chigger develops after a series of metamorphoses has a blind gut and is consequently unable to defecate. An animal that spends its entire adult life in a constipated state is bound to develop a pretty nasty nature, and this may be reflected in its offspring. To these two important negative influences I ascribe chigger attitudes, which I've found universally deplorable.

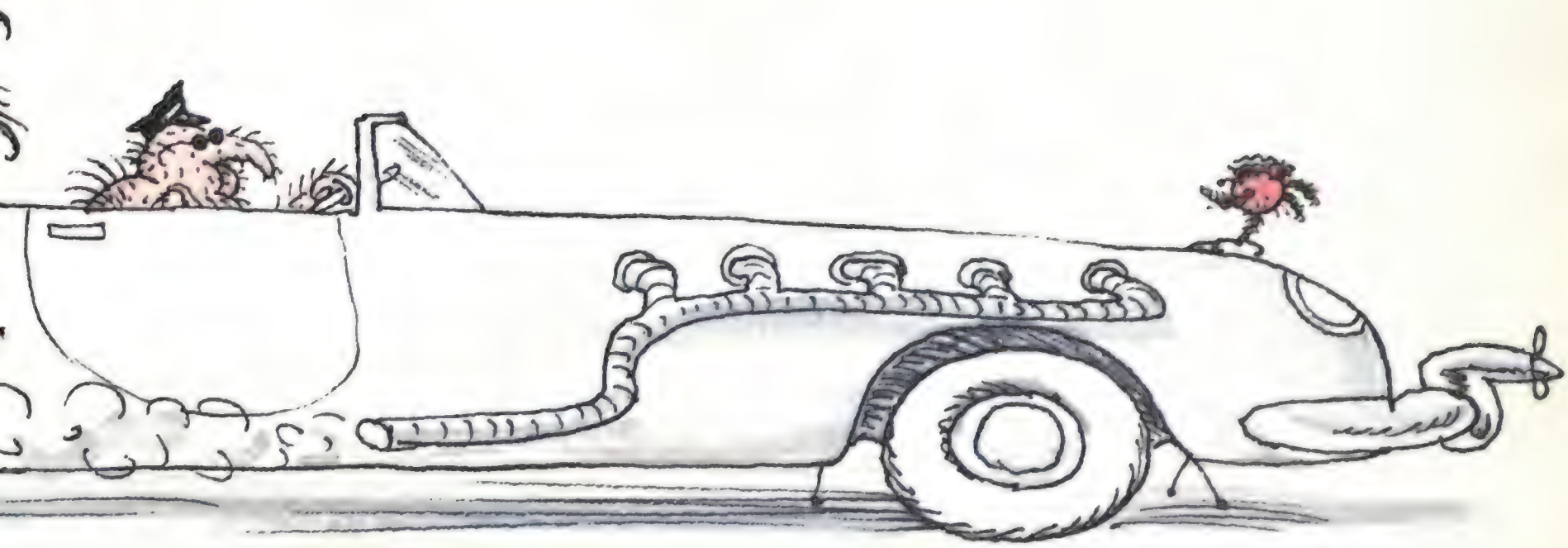
A naturalist and editor emeritus of Smithsonian Institution Press, Rivinus last wrote in this magazine on blackbirds as pests (November 1976).

So much for anthropomorphic speculation. Now let's get down to biology. Chiggers—or the larval form known as "chiggers"—constitute about 2,500 of some 35,000 species of mites which have been classified and described. Acarologists generally accept an estimate of half a million mite species still waiting to be discovered. Mites may well be the most numerous forms of arthropod life on Earth. Many species perform herculean labors of tremendous service, as in breaking down field and forest litter and converting it into soil. Others are serious pests.

Actually, the troublemaker we call a chigger is only one stage in an astonishing succession of metamorphoses which ultimately result in an adult mite.

The stage most interesting to us is when the larva, or chigger, seeks to engorge itself on a host, presumably you or me. It is usually red, so small as to be virtually invisible to the naked eye, and equipped with a pair of piercing jaws known as chelicerae. It lurks on grass stems, leaves, shrubbery and so on, usually in dry, sunny spots on woods' edges where host animals are most likely to be found. The larva latches on to any suitable passing host, and searches, at a surprising rate of speed for one so small, for a good spot to begin its remorseless assault.

Once the chigger has selected its target area (often a spot where clothing is tight or two parts of the body are in contact: around the belt line or in the groin, back of the knees, or an armpit), it penetrates through the outer layer of skin with its chelicerae and injects



a salivary secretion into the opening. The saliva contains powerful enzymes which break down the skin cells, and these cells become a large part of the chigger's food. As long as it is undisturbed, the chigger continues alternately injecting saliva into the hole and sucking up tissue fluid and the contents of damaged skin cells (*not* blood) until it is fully fed.

During this process the human skin reacts defensively to the chigger's activity, and the result is the formation of the stylostome, apparently from a combination of host tissue reaction and chigger secretions. The stylostome may ultimately become longer than the chigger itself.

An undisturbed chigger will become engorged in four days. Authorities variously estimate the survival time of an unfed chigger from 14 to 30 days.

Strangely enough, the chiggers that make us itch typically prey on either reptiles or birds, although they may also attack other mammals. Apparently the chiggers that consistently prey on such mammals as mice or squirrels either don't find humans palatable or feed without producing irritation and are not felt. Dr. Rodovsky says, "The extreme human reaction to pest chiggers is probably related to our being such a foreign host for them. . . . The mammal chiggers that carry scrub typhus to Man in the Orient and the Pacific are benign biters: You don't feel the bite, you just come down with the disease."

Troublesome varieties of chiggers are found nearly universally. They are active in warm weather as far north as Minnesota and Massachusetts. The one thing that seems to slow them down everywhere is a drop in temperature below 60 degrees F. Some varieties do best in dry areas, others in damp spots, but most authorities agree that chiggers tend to concentrate in "mite islands," while nearby spots of apparently equal attraction may be free of them. This was noted particularly in Pacific areas during combat operations in the three wars we've recently been involved in there. Some GIs would suffer devastating chigger attacks in the field, while others in the same unit, bivouacked or resting nearby, would be entirely free. Now that I think of it, we had similar experiences on Louisiana maneuvers in 1941. We attributed the fact that some people seemed to get worse infections than others to the fact that they were tastier. Knowing what I do now, I'm more disposed to think it was because they had got into a chigger concentration area which others, only a few yards away, missed.

Now that we have accumulated all this information about the life history of chiggers, what can you and I do to protect ourselves against them, or if we pick up a few, to alleviate our suffering?

Surest, of course, is avoid them. Stay in the city when temperatures go above 60, or at least stick to roads and trails. That's not a suitable answer, of course, for the hunter, fisherman, bird watcher—or soldier. So my next piece of advice is "Keep moving." The worst chigger infestations I've experienced followed times when I sat or lay down in a sunny spot at

midday. You'll get a few chiggers while moving, but sitting on the ground in chigger territory is really asking for it.

The one suggested repellent we found effective during those 1941 Louisiana maneuvers was flowers of sulfur. When we powdered ourselves and our clothes with it, we experienced no further chigger trouble. But a word of warning. Sulfur has a strong odor. The combination of sulfur and sweat for several unwashed days rendered us unfit company for anybody who wasn't on a similar regimen.

Alternatively, tuck pants legs inside boots and button or tape cuffs and collars as tightly as the tailoring and your tolerance permit. Make it as difficult as you can for a chigger to find access to you. Spray your pants legs and shirt sleeves with a repellent, and repeat the spraying while you're in the field.

When you get home, launder your field clothes in hot water. Radovsky assures me that a half hour of immersion in water as hot as 100 degrees F should kill chiggers. I can report from personal experience that chiggers will lie in wait for you in unlaundered clothes (or those laundered in cool or cold water) and will get you next time you put them on.

And when you feel the insistent itch of a chigger bite? Well, probably you'll scratch. You may dislodge the chigger, probably will. If you take a good hot bath, and soap repeatedly, you'll get rid of that chigger and others. But you won't get rid of the stylostome, and that's the true cause of your itch. If you scratch deep enough to remove the stylostome you'll be running a risk of infection.

I haven't found any source of permanent relief, but one or two of the currently available ointments containing a local anesthetic do seem to help. The popular "remedy" for which I see no justification is to dab nail polish on the spot. It may smother the chigger, but it won't have the slightest effect on the stylostome.

So, good luck in your excursions afield henceforth. If you follow some of the advice I've offered you, you may never be troubled by chiggers again. But perhaps you also may find some alleviation from future chigger harassment by knowing at least what your attacker is and how it operates.

Chiggers live in mite islands, where the ceaseless search for a suitable host is a matter of life or death.

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By Michael Kernan

Remembrances of those who fell from the heights

A lucky few have plummeted from the sky and lived to tell about their experiences of intense, complex emotion—but little fear

Illustrations by Jim Spanfeller

Just before five o'clock on the hot, hazy afternoon of June 19, 1977, Mark Mongillo swung his legs out of the open right-hand door of a Cessna 180, grabbed the wing strut, gazed down at the orange groves of Indiantown, Florida, near West Palm Beach, waited for his moment and jumped. It was his 12th sky dive.

At 22, searching for something more exciting than a factory job in his native Southington, Connecticut, he had moved to Florida and had taken up diving at the Circle T Ranch Airport. He had been a student there for about a month. He was nervous about his next jump after this one, the 13th.

Stepping off into the sky, he fell free for about 1,100 feet and reached for his rip cord at about 2,500 feet. For some reason, he forgot to hold the jumper's arch, with legs, arms and head thrown back, pelvis thrust forward, and quickly found himself in a headfirst dive.

Only the pilot chute of his main parachute opened and the suspension lines tangled around his legs. In an instant the entire mass of silk wrapped him in a cocoon. Still plunging headfirst, he wasted no time trying to fight free but ripped open his reserve chute.

That one too whipped around his legs. He was bound like a mummy.

He had jumped at about 3,600 feet. It is estimated that the human body, falling free, will reach 99 percent of its low-level terminal velocity—the limiting uniform velocity attained when the resistance of the air becomes equal to the force of gravity—after 1,880 feet. Mongillo's velocity when he hit the ground was about 120 mph.

Since 1960, between approximately 13,500 and 20,000 Americans have died every year from falls, many of them from comparatively modest heights or on the same level, but every year a lucky handful have survived plunges from improbable heights. Those survivors have brought back insights about falling that most of us, fortunately, have never experienced on our own. Mark Mongillo is one of them. He described his fall as follows:

"My exact words when the second chute didn't open and I looked over my left shoulder and saw I was coming down level on my back were, 'Shoot, I'm dead,' and I looked up and said, 'God help me.' Then I just watched the ground coming up over my shoulder. It was about a 30-second drop in all, and you think that's no time, but it was a long time falling. A lot goes through your mind. I just thought I was dead; I accepted it; I didn't panic or anything; I wasn't scared. I thought, 'At least I'm not going to feel any pain when I hit the ground, it'll be quick, you know, over with.'

"Just before I hit the ground I tensed up, then something made me relax. I turned my head away and said, 'This is it, damn.' I was coming down flat on my back, like I was in bed, with the stuff around my legs and my head slightly raised. I had my helmet on.

"I didn't even get knocked out. I hit on solid ground, bounced twice and slid down into an irrigation ditch with about six inches of water. I hit right below my neck, where my shoulders start. Then I heard my legs come crashing down. I broke my right femur bone. I didn't get a bruise or a scratch on me. I opened my eyes. I couldn't hear anything, just this real high-pitched ring in my ears. I thought, 'Holy Moses, I just fell 3,600 feet and I'm still alive.' I tried to get up but could tell something was wrong with my leg. I thought I was going to die in the ditch because no one was coming over, they didn't want to because they figured I was in little pieces."

Paul Poppenhager, manager of the airport, spotted Mongillo from the air, landed and ran up, to hear Mongillo call, "Hey, Pop, I'm not dead. I'm OK."

Mongillo spent eight hours in surgery. A rib end had lacerated his liver. His kidneys were so badly bruised that they failed to function for three days. He still wears a pin from knee to hip in his right leg. A solidly built 160-pounder at five feet ten, he weighed 118 when he left the hospital. The bills came to about $13,000. He promised his parents he would never jump again and, in time, returned home to work in a machine shop in Southington. He is now back in Florida living and working only about 30 miles from the Circle T Ranch Airport.

He never has nightmares about his fall. "It was a calm feeling," he keeps saying, "something came over me like everything was going to be all right, and I couldn't picture myself dead, you know? It didn't bother me. Weird." He would like to try one more parachute jump.

Is the fear of falling innate in humans? Psychologists used to believe that it was innate, but recent studies provide evidence that it develops with age after the onset of locomotion and is hence acquired.

We prisoners of gravity have made falling a basic metaphor of failure: the fall of Lucifer, the fall of Adam, the fall of the House of Usher, the fall of the stock market. And one might add, it is the fall that fascinates us rather than the landing, just as dying appears to frighten most of us more than death.

Some falls have been truly incredible. Vesna Vulovic, a hostess for Jugoslavenski Aerotransport (JAT), fell 33,330 feet (according to the 1980 edition of the *Guinness Book of World Records*; a news service calculated it at 31,000 feet) inside a section of the tail unit when a DC-9 blew up over Czechoslovakia on January 26, 1972. It was reported that she suffered a fractured spine and brain damage, was paralyzed from the waist down and had to have pieces of metal removed from various parts of her body. She apparently was hospitalized for 16 months after emerging from a 27-day coma.

The author, a Washington, D.C., writer and frequent contributor, wrote about stuttering in the May SMITHSONIAN. *He fears falling.*

Rescuers found the young woman still strapped to her seat, lying in a stream. Completely recovered today, still working for JAT, though not as a stewardess, she remembers nothing of her fall.

"All I can recall is stepping onto the plane to start the flight," she told the press. "From then on it's a complete blank until my first memories of waking up in the hospital." She has flown many times since.

The longest fall unassisted by a plummeting tail section is listed by Guinness as 21,980 feet, during World War II, January 1942. The charmed one was Lieutenant (now Lieutenant Colonel) I. M. Chisov of the Soviet Union, who fell from a damaged Ilyushin 4, landing on the edge of a snowy ravine, with a glancing blow, and sliding to the bottom. His pelvis was fractured and he suffered severe spinal damage.

The perhaps suspiciously specific altitude claimed for Chisov is challenged by an American whose story of a 22,000-foot fall from a B-17 is surely even more remarkable. Alan E. Magee reported that on January 3, 1943, his bomber was hit during a raid on St. Nazaire and went into a tight spin, trapping him in

the ball turret. Not having been able to fit his chute into the turret with him—he was about 145 pounds, five feet eight—he had left it by the hatch. It didn't matter anyway.

"The last thing I remember," he said, recalling the event 36 years later, "was that the spin threw me up to the top of the turret and pulled me through a hole out of the plane. I was hit in the face by flak, and my oxygen mask was torn off."

Two French children later told him they had seen his body cartwheeling down through the night sky, lit up by fires. He landed on the glass roof of the railroad station at St. Nazaire.

He believed that a bomb exploding inside the station at the precise instant of his landing equalized the force of his fall. In any case, he woke up to find himself lying on the roof, then blacked out again. A German rescue crew brought him down, and he spent the next three months in the hospital.

The 2,000-foot fall of Sergeant Roger Reynolds of the U.S. Army's Golden Knights parachuting team was captured on television. He had jumped at an exhibition April 24, 1974, at the Dogwood Festival in Charlottesville, Virginia, and when his chutes both failed him ("Everything seemed to slow down; I knew I was dead but I felt no pain. . . . I saw the roofs of houses come up at an incredible speed"), he landed on the newly seeded lawn of Dr. William O'Brien, a neurologist. He hit the ground at approximately 85 mph. He broke numerous bones, cracked some ribs, suffered a concussion and internal injuries. Two days after his release from an 18-month hospital stay, with a brace still on his left leg (he had at one time been told he would never walk again), he jumped again—his 964th jump. He has since completed 36 more jumps to bring his total to 1,000. Two years after his release from the hospital he ran in the Boston Marathon and has been running in it every year since.

Mountain-climbing accidents well-documented

Falls from airplanes are of course a fairly recent development. People have been falling off mountains for centuries. There is even an annual publication devoted exclusively to the subject, "Accidents in North American Mountaineering," whose 33rd issue lists 128 accidents reported in 1979 in the United States and Canada involving 167 people, injuring 95 and killing 55. These accidents are broken down by state and mountain, and each one not only is described but is analyzed, the causes ranging from the failure of a knot to wasps.

One articulate mountain faller, Ray Smutek, editor of *Off Belay*, a mountaineering magazine, recounted his 1967 experience in the February 1978 issue, reprinting a paper he had presented at the April 1977 Yosemite Mountain Medicine Symposium.

"Because of an error in rope management," he reported, "I took a very spectacular seventy-five foot fall, in the process cleanly breaking off the hinge part of my elbow . . . tearing my ankle ligaments completely free of the bone, and taking a helluva wallop on my shoulder. I was, as we say in the trade, all busted up, and dangling like a spider. . . ."

Climbing 9,415-foot Mt. Stuart in Washington, he had tried to pendulum across a rock face by draping his belaying rope over a horn of rock. The rope slipped off, and he fell the length of the rope, slamming against the mountain as he went.

"A million thoughts flashed through my brain"

"I vaulted over backwards. The first impact was on my left shoulder, not painful, but stunning, knocking the wind out of me and dulling my senses. Then a half somersault and I was upright again facing in. My left ankle took the brunt of the next impact. . . . *I felt no pain*, but I knew it was gone; my foot couldn't have possibly bent that far without damage. The next forty feet took place in *slow motion*. I was erect, but facing out sliding down the steep slabs, and riding on my pack.

"Though my sense of pain was dulled, my awareness was not . . . . *a million thoughts flashed through my brain*. I thought of Pat up above, tied to me, but with no slack with which to effect a belay. . . . I thought of my family." Oddly, his memory of the 1967 event had faded so much after ten years that he had to refer to his diary to bring it back.

Smutek also mentioned a special problem of the climber-faller: often the episode is harder on the companions than on the victim. His friends were so shaken, so prone to panic action, that he had to direct —swinging at the end of his rope in midair—his own rescue and first aid.

All of these effects are reported in a classic document on falls, the first known scientific study, published in 1892 by Albert von St. Gallen Heim, a geology professor at the University of Zurich. His "Remarks on Fatal Falls" first appeared in the yearbook of the Swiss Alpine Club. Based on 25 years of experience on the mountains and hundreds of interviews with climbers, roofers and assorted accident victims, it corroborates the reports of modern fall survivors with prescient precision.

"The subjective perceptions of those who fall to their deaths are the same whether they fall from the scaffolding of a house or the face of a cliff," Heim asserts, reasoning that his survivors "awoke as though from death and could tell us exactly what those who

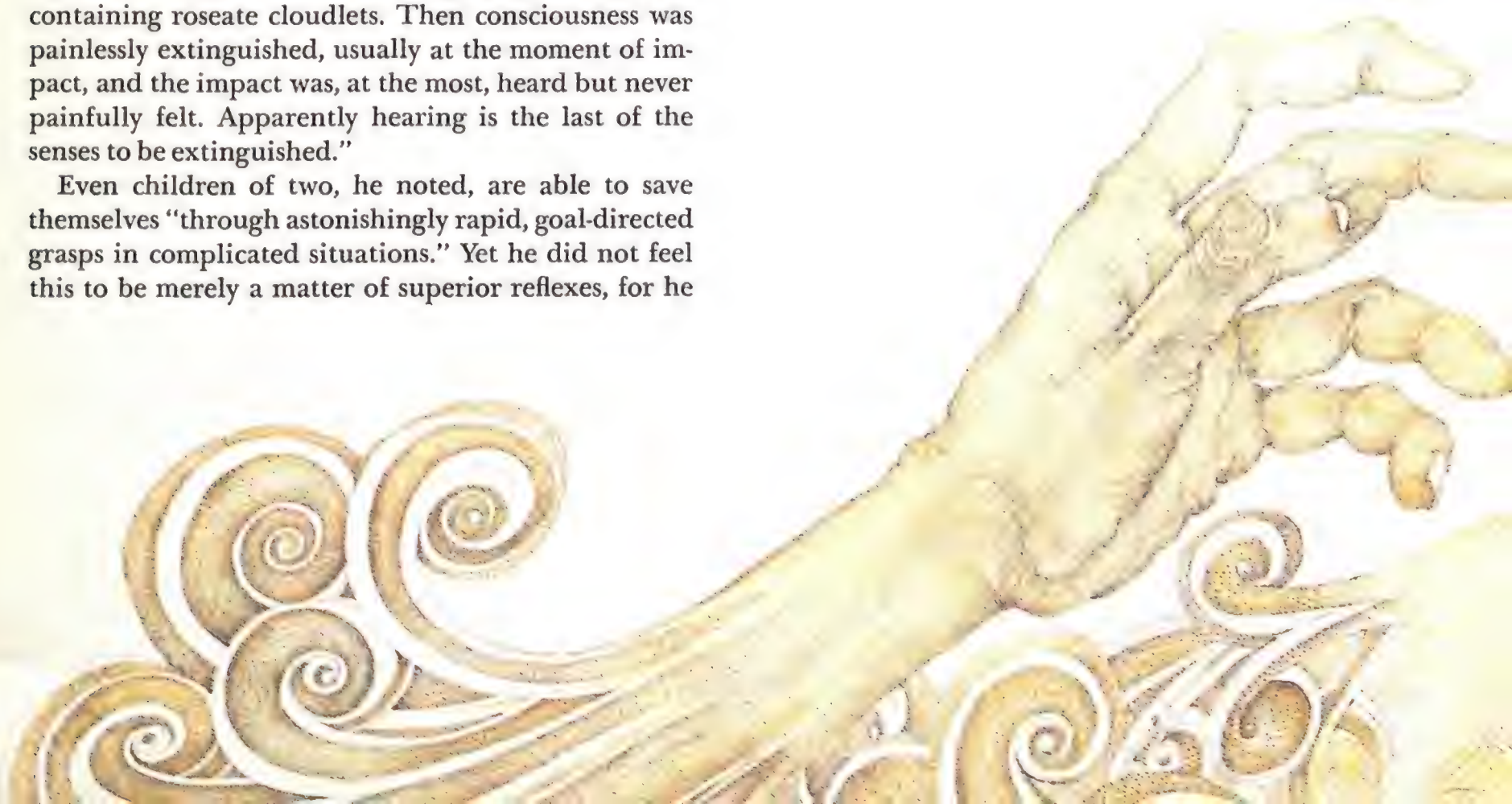
actually died from sudden misfortune must have experienced."

In nearly 95 percent of his interviews, he found that "no grief was felt, nor was there paralyzing fright of the sort that can happen in instances of lesser danger (*e.g.*, outbreak of fire). There was no anxiety, no trace of despair, no pain, but rather calm seriousness, profound acceptance, and a dominant mental quickness and sense of surety. Mental activity became enormous, rising to a hundred-fold velocity or intensity. The relationships of events and their probable outcomes were overviewed with objective clarity. No confusion entered at all. Time became greatly expanded. The individual acted with lightning-quickness in accord with accurate judgment of his situation. In many cases there followed a sudden review of the individual's entire past; and finally the person falling often heard beautiful music and fell in a superbly blue heaven containing roseate cloudlets. Then consciousness was painlessly extinguished, usually at the moment of impact, and the impact was, at the most, heard but never painfully felt. Apparently hearing is the last of the senses to be extinguished."

Even children of two, he noted, are able to save themselves "through astonishingly rapid, goal-directed grasps in complicated situations." Yet he did not feel this to be merely a matter of superior reflexes, for he cited numerous subjects who acted with amazing sharpness in the face of death but were "completely paralyzed by dread" in less dangerous situations.

A remarkable instance of his own reactions during a potentially fatal fall is worth recounting in full. Heim was 32 at the time.

"In the summer of 1881, I fell between the front and rear wheels of a wagon traveling between Aosta and St. Remy and for a fleeting moment I was still able to hold onto the edge of the wagon. The following series of thoughts went through my mind: 'I cannot manage to hold on until the horse comes to a stop; I must let go. If I simply let go, I will fall on my back and the wheel will travel over my legs. Then at the least a fracture of the knee-pan or shinbone will be unavoidable; I must fall upon my stomach and the wheel will pass over the backs of my legs. If I will then tense the muscles, they will be a protective cushion for the bones. The pressure of the street will be somewhat less likely to break a bone than the pressure of the wheel. If I am able to turn myself to the left, then perhaps I can sufficiently draw back my left leg; on the other hand, turning to the right would, by the dimensions of the wagon, result in both legs being broken under it.' I know quite clearly that I let myself fall only after these lightning fast, wholly precise reflections, which seemed to imprint themselves upon my brain. Thereupon through a jerk of my arm, I turned myself to the left, swung my left leg powerfully outward, and simultaneously tensed my leg muscles to the limit of their strength. The wheel passed over my right ham, and I came out of it with a slight bruise. Several persons



have told me quite similar stories. What they reveal is not merely an admirable presence of mind or a simple reflex movement. Much more than that they reflect the dread-engendered uttermost exertion of the human spirit appearing in moments of extreme excitement from natural necessity."

Some fallers, he wrote, lose consciousness at the start, others upon impact. Many were able to take corrective action, such as aiming themselves toward water, swimming to shore and climbing out, without remembering a bit of it later.

"During the fall itself," he said, "the faller, as a rule, remained quiet. A scream was hardly ever heard."

In his own climbing days, the ebullient if somewhat accident-prone Professor Heim impulsively grabbed for his hat as it flew off during a descent of the Fehlalp. He dropped 66 feet and thus was able to add a vivid passage to his report, detailing his alert efforts en route, to remove his glasses and hang onto his alpenstock for possible use in the rescue, worrying that he would miss his opening lecture at the university, consoling his family in their grief.

"Then I saw my whole past life take place in many images, as though on a stage at some distance from me. I saw myself as the chief character in the performance. Everything was transfigured as though by a heavenly light and everything was beautiful without grief, without anxiety and without pain. . . . Elevated and harmonious thoughts dominated and united the individual images, and like magnificent music a divine calm swept through my soul."

Heim also noted that the episode is more painful, at the time, to the faller's companions. "Often the spectator, incapacitated by paralyzing horror and quaking in body and soul, carries away from the experience a lasting trauma," in contrast to the faller himself. "I must even testify that the memory of a cow's fall is still painful for me while my own misfortune is registered . . . as a pleasant transfiguration. . . ."

The "visual cliff" experiment

Falling, the experience itself, the fear of it, the perception of its danger: what can it tell us about our ability to think, the connection between thought and action? One celebrated experiment was Dr. Eleanor Gibson's "visual cliff," conducted in her psychology laboratory at Cornell University. To test the perception of depth at an edge in young animals, she built a "visual cliff" by placing a board about one foot across, covered with checkerboard material, across a sheet of heavy glass with the same patterned material directly beneath the glass on one side (the "shallow" side), but several feet below on the other (the "cliff" or "deep" side). An infant or other young animal could be set to crawl on the checkerboard-patterned surface and peer down through the clear glass to the "cliffside" and below. She found that most of the crawling infants tested refused to venture out on the glass pane or "cliffside," even when enticed by their mothers.

"My experiments," Dr. Gibson said recently, "weren't concerned with fear but with the connection between visual perception and action. We used crawling infants and very young animals, some newborn, like chicks and sheep and goats, which can navigate almost at birth. We found that, at a reasonable height, the animals won't go over the edge. The animals perceive the 'affordance' of a surface of support. But this says nothing of fear. Fear of heights develops much later and is probably not inborn, but learned."

Another "visual cliff" experiment was conducted in 1963 by Drs. Richard Held and Alan Hein, now of MIT. Working with two groups of kittens reared in the dark, they allowed one group the freedom to move about, with some restrictions, on its own—the "active" group. The other group was confined to being moved around in a basket—the "passive" group. The "active" group avoided heights more than the "passive." They even produced both effects in the same cat, covering one eye during the active period: when only that eye was later uncovered, the cat could not tell shallow from deep and did not avoid the "cliffside"; when only the other eye was uncovered, it displayed avoidance behavior. When the "passive" kittens were later allowed to move freely they quickly developed normal avoidance behavior.

A specialist in fear of heights is Dr. Joseph Campos,

head of the developmental psychology program at the University of Denver. Fear, he finds, is quickly acquired by most nonflying creatures and appears to be related to movement in space.

Campos and his colleagues measure fear by heart rates. An infant not yet at the self-propelling stage shows no change in heart rate when placed on the visual cliff, but a crawler does.

"Movement can facilitate calibration of distance, an appreciation of distance," Campos says. "It has to do with experience. An adult at the top of the Empire State Building has a breakdown of distance judgment too." Which might explain the equanimity with which most of us can gaze from the window of an airliner traveling seven miles up.

It used to be, and quite likely is still, a common childhood notion that a person who fell from a plane would die of fright long before landing. Is this a myth?

"No, it's very possible," says Dr. Campos. "The first reaction to the realization might be a gigantic gasp. The heart rate rises and then drops tremendously. This is called the 'diving reflex.' You could lose enough blood flow to the brain to cause unconsciousness. It is not out of the question for cardiac arrest to follow."

The sudden rise and fall of blood pressure could also cause a form of vertigo: the fear produced by a glance down from a height, says Campos, could cause enough of a drop in blood pressure to bring on dizziness and nausea.

To this notion Dr. Nancy Rader, a UCLA psychologist, adds the suggestion that some babies, confronted with the visual cliff, show more trust than others in their tactile input. Perhaps this is why some of us, standing quite safely on a high balcony, nevertheless find our knuckles gone white with clutching the rail: it is as though we needed reassurance from our tactile sense against the visual danger signals we are getting.

For some people, that thrill of fear, that rush of blood, is a challenge. Mountain climbers, of course, fliers of all descriptions, and hang gliders qualify, but surely the purest form of the faller-for-fun is the sky diver, and it does appear that of all people, sky divers supremely fulfill Tom Wolfe's definition of "the right stuff": not mere bravery in risking one's life but the calculated approach to the impossible, or to death, always controlled, seeking and passing a "seemingly infinite series of tests." What is it that impels a person to systematically search for the sensation of living at the very edge?

Andy Keech, an Australian who works for the Embassy of New Zealand in Washington, has been sky diving for 21 of his 41 years. He has a reputation as a crack diver. A photographer, he has published three books of photographs on diving. Just over a year ago he was enticed to jump off El Capitan in Yosemite National Park, a 3,000-foot drop (about the same distance Mark Mongillo fell). The fact that the act was illegal didn't bother him, but he was awed at the prospect. He barely slept for two weeks beforehand.

"If you filmed the launch off that bloody thing at 200 frames a second, in slow motion, well, I saw every one of those frames."

A swan dive at 100 miles an hour

The plan was to run off a nine-foot ramp, three paces. Considerable technique was involved, because of what the human frame does when falling: he had to jump upward in a head-high attitude. If he leaped straight out, with no fierce airstream to maneuver against, the body would inexorably roll forward into a head-down position and then begin to somersault and overrotate to a back-to-Earth attitude.

"You have to keep your head back. You're coming up to about 100 miles an hour, you've got another three seconds of control, because of the speed you've attained, to fly away from the cliff. The cliff is about 20 yards away, and you tend to rotate toward it. In all, you've got about eight seconds to maneuver in. It's all right if you know what you're doing."

When finally it happened, and he and a friend swan-dived off in quick succession, the jump was an anticlimax. There is a film showing two other men jumping off El Capitan. It does seem too quick. They leap up, they plunge, they plane out from the face, and abruptly the chutes open.

Keech made his first jump at 19 because "it was one of the things on my checklist, to do in my life." The first time, the cord was pulled for him automatically from the plane. He tried a few more, and "about 30 jumps down the line all these neurotic things were sort of swept aside and there was nothing but absolute in-

toxicating fun." At 19 a person usually feels immortal.

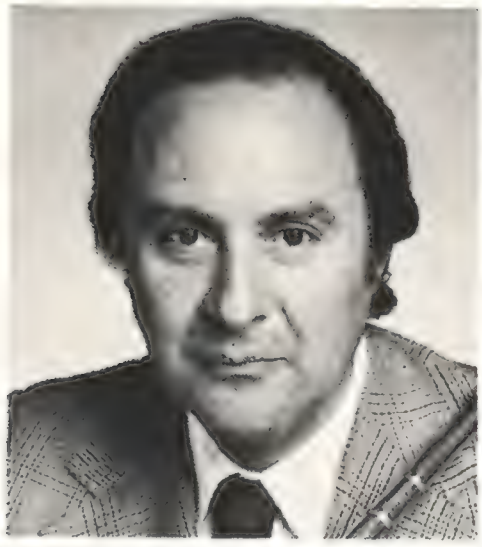
"The first 500 jumps are easy. Then you start to understand what the numbers are, the risks. You become a better jumper, but you also outgrow that feeling of immortality, so you get more careful, you plot your strategy."

The same sky-diving film showing two men jumping off El Capitan also shows two dozen people piling out of a plane at 12,000 feet, slipping gracefully into formations, docking and undocking. They fall for about a minute. In slow motion it looks rather casual, if windy, everyone's clothes whipping furiously as they move with the dreamlike deliberation of underwater walkers. Watching, one loses all sense that these people are falling. It is only toward the end of the minute, when first one then another blossoms out with a chute and is instantly whisked upward out of the picture—whew! like that!—that one remembers the divers are actually all this time dropping like stones.

"It's how well you can carry the stress, cut the mustard," says the bearded, flat-bellied Keech. "You get to know who the mustard-cutters are."

For the mustard-cutters and for most of us, the prospect of falling remains a part of life from infancy to brittle old age, when a misstep on a sidewalk can start a person on a depressing voyage from hospital to nursing home and beyond. No roseate cloudlets for these fallers. But for the few who are drawn to the heights, to the mountains, to the sky, it is as the poet wrote: distance lends enchantment.

IDENTIFY ANY ONE OF THESE
AND TAKE A BONUS



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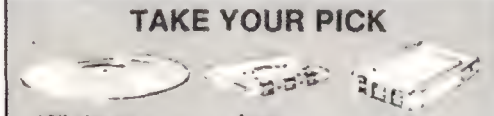

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By Brian Vachon

The world's biggest relief map gets an overdue facelift

Long ignored in a New England campus dorm, a 65-foot-wide blowup of the United States now provides a true-to-life picture of the land

Quintero and a helper fit new blocks onto the map surface, as they refurbish Grand Canyon area.

One Sunday morning in May 1980 Jaime Quintero, a 39-year-old Colombian cartographer, stood astride several of these United States and pondered their future. On the one hand, Quintero was impressed. He is a man who loves maps and the Babson College Great Relief Map, conceived in 1923, completed in 1940, was a lot to love. In perfect relief miniature, it stretched 65 feet from Maine to California and 45 feet from Texas to Michigan. Built on a scale of four miles to the inch, the giant, dome-shaped reproduction of the surface of the United States was remarkable. But on the other hand, Quintero felt apprehensive.

"Forgive me, God, this is it," he whispered, and then pointed a spray gun loaded with a gallon of white primer paint onto the face of the map. Several hours and 35 gallons later, he was finished. So was the work of an untold number of previous cartographers who had spent years meticulously tracing the paths of rivers, the placement of cities and towns, the confines of Indian reservations and national parks. Quintero had turned the map into an expressionless, white, bumpy shell. Also he had committed himself to bringing the map up-to-date, to trace newly established cartographic information, to bring new concepts of geography to the project.

"Flying" over it on a suspended platform, Jaime Quintero retouches the map. Flags are city markers.

Photographs by Richard Howard

The map was conceived by Roger Babson, the statistician and economist (he predicted the stock market crash in 1929) who founded the college in Wellesley Hills, Massachusetts, that bears his name. He was a stickler for accuracy, so the National Map Committee, which he organized, consulted surveys, the War Department and various other specialists to guarantee as much topographical accuracy as possible. A brick building was constructed on the campus to house the map, and visitors who encircled the balcony above it were given a vantage point equal to being in space 700 miles above the Earth.

During World War II, the map building became a classified area and the map itself was used to establish elaborate transportation and evacuation plans. Later, the map was studied by businessmen who, according to Babson, could get "more information in less time than is possible in any other way or place."

The map consisted of 1,600 17-by-12-inch blocks, each carefully built of cardboard with topographic details modeled in plaster. Babson thought photographs of portions of his map would replace conventional highway maps. That never happened, although the map attracted thousands of visitors a year to the Wellesley Hills college.

But eventually the building that housed the map became a college dormitory. "Boys were on one side of the map, girls were on the other, and at night they would get together and party on Texas," Quintero would say later.

Anton Zenns, who helped cast blocks for original map 40-odd years ago, recasts broken pieces.

Quintero alters Mt. St. Helens to conform to its new shape after May 18, 1980, eruption.

"The deteriorating condition of the map presented a serious problem," said James Boudreau, director of the college library. "A map committee was organized to consider the available options regarding the future of the map, including that of donating it to a suitable institution. Recognizing its potential as a unique educational resource, the committee decided to retain and refurbish it—not alone on the basis of its instructional value to the college, but largely as a service to the community."

One man's gesture can be another man's obsession. Enter Jaime Quintero. He had been a scientific illustrator and cartographer for *National Geographic* for 12 years, and his last job before leaving there was to draw an illustration that would show a cross section of the United States. He remembered the Babson relief map from a picture he had seen in a textbook years before while a graduate student in Colombia, and decided to make a pilgrimage to Wellesley Hills to see if it could help him in his illustration.

"It looked like a prison inside the building," Quintero remembers. "The windows had been boarded up, and the map was dark and dirty. Half of the blocks were broken. There had been vandalism and neglect."

Quintero came up with a proposal—$30,000 to repair, recast, paint in natural landscape colors, and update the giant map—and it was approved by the college. He was going to need help and he was lucky. Anton Zenns, who had helped cast the blocks for the map for 12 years during its original construction beginning in 1924, could be lured out of retirement. "I put a lot of my life into this map," he said later. "I was certainly willing to put in one more year." Recasting from the original molds, and in the same room he had worked in during the 1930s, Zenns reconstructed 475 10- to 15-pound blocks that had been destroyed and helped patch many others that had been broken.

Quintero convinced Babson College officials to tear down the walls covering the windows. He persuaded student volunteers to help carefully wash each of the map's 1,600 blocks with soap and water, removing coins and BB pellets embedded by vandals. And, he convinced officials of the U.S. Geological Survey to donate 500 current 1:250,000-scale maps of portions of the United States so that he would have up-to-date topographical information.

The original map had been painted a neutral beige, except for red circles imprecisely marking the boundaries of cities, and blue lines marking the paths of rivers. Using the donated USGS maps as guides, Quintero and his helpers traced the new cartographic information onto the blank blocks. There were tremendous

Brian Vachon lives and works in Montpelier, where he is the editor of Vermont Life *magazine.*

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changes in the topography. Hydropower dams had altered the course of rivers and had created hundreds of new lakes. Villages had grown into cities.

Quintero and Anton Zenns modified old blocks and created new ones, incorporating precise cartographic data and outlining cities according to their current boundaries. Finally, they restored the blocks to their proper places—backward. "For some reason, and we'll never know why, the map was originally put down in the wrong position," Quintero says. "Canada was facing south. We oriented it toward true north and we gained a major element. The sun now shines through the windows and illuminates the map so that mountains will extend shadows on the same scale as real mountains. The shade of light will be exactly the same."

While listening to appropriate recorded music—such as Grofé's *Grand Canyon Suite*—Quintero worked ten hours a day, often from a pulleyed platform he had designed so that he could hover like a bird over the map. Although the original had been beige, Quintero decided he could improve upon it by using a palette of color. Greens and yellows depicted areas of natural vegetation. Darker colors, when the light from the newly uncovered windows shone on them, gave a greater illusion of height and depth to the mountains and canyons.

A series of projectors in the attic over the map, installed by Roger Babson himself years ago, can be trained on its surface and slides can project weather patterns, new highways, population trends and natural resource deposits. The map finally can be used as it was originally intended—as a research tool.

Jaime Quintero won't stay at Babson College to see these accomplishments take place. Though he is teaching a course in geographic art at the University of Mexico, his heart is really in map making. In particular, he would like to construct a map almost like the one at Babson, maybe a little bigger, and have it reside in Washington where more government officials would have access to it. "I'll do it if Tony is willing," Quintero says, looking at Anton Zenns. "I'm a geographer but he's the expert at building maps. What do you say to that, Tony?"

And Anton Zenns grins, probably in anticipation.

With reconstruction of the relief map complete, Quintero inspects handiwork from somewhere north of Minnesota. The topography had changed and the cities grown since the map was first created.

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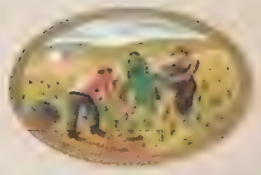

Almadén makes it right.

By Dora Jane Hamblin

At 'Ragbrai' time in Iowa, everybody puffs to Keokuk

A strange midsummer disease, the Register's *Annual Great Bicycle Ride Across Iowa, afflicts thousands who cheerfully if wearily pedal on*

The phenomenon of the big ride first came to my attention a couple of years ago when I was waiting for an airplane in Burlington, Iowa (pop. 30,000). Also loitering around the terminal was a pair of very sharp characters from Los Angeles, trying to arrange to ship their shiny ten-speed bikes back to the Coast.

As an Iowan born and raised (but long since removed), I would be the first to take umbrage at the faintest suggestion that Burlington wasn't every bit as up-to-date as, say, Kansas City. But still I didn't expect a couple of sharpies from L.A. at that airport. And with bicycles, for heaven's sake.

Finally I had to ask, point-blank, what was the deal.

"Ragbrai," they said, regarding me with the kind of superior pity usually reserved for people who ask directions to Main Street when they're standing on it.

RAGBRAI, the *Des Moines Register*'s Annual Great Bicycle Ride Across Iowa, has become the state's greatest contribution to the American scene since Herbert Hoover, *State Fair*, Grant Wood and the Van Allen belt. And it's more darned fun for more people than any combination of any two of the above.

Late this month about 5,000—or maybe 15,000, nobody really counts—people of all ages and persuasions from all over the place will make their way by train and bus and plane and bicycle to Missouri Valley, Iowa, and then stream in an amiable, colorful, cruising traffic jam 490 miles up hill and down dale, zigzagging eastward across the state to Keokuk. There are no winners, no prizes, and if anybody inadvertently refers to the thing as a "race" he is shouted down. This is a *ride*, chum, done just for fun—puff puff, pant pant—and the camraderie of the not-so-open road, the discovery of instant friends and local color in hamlets with names like Stratford (Main Street here is named Shakespeare) and Tripoli (pronounced Tri-POL-a) and Elkader (named, the locals point out proudly, for an Algerian amir named Abd el-Kader who united some tribes against their French colonizers).

Because the route is planned to avoid major highways and large cities, there are often more riders than natives in luncheon or overnight stops. Towns en route start planning months ahead of time, restaurants and beer joints lay in siege supplies, and town parks are equipped with extra trash barrels and portable toilets. Even so, they are occasionally overwhelmed: last year an organizer in Perry, Iowa (pop. 7,000), watched his city grow to 10,000 in one long afternoon and evening and admitted that "We abandoned our parking plan. After giving up on Plan A, we went to Plan B, then C, D, E, F, G. . . ."

In towns and between, the spaced-out riders run a gauntlet of lemonade and sandwich stands manned by eager fund raisers from churches, Jaycees, 4-H clubs, Scouts, women's clubs and individual entrepreneurs. Mr. and Mrs. Carl Nus, a few miles west of Volga, announced cheerfully last year that they were selling refreshments to pay for a canoe two of their boys bor-

Myth of Iowa's flatness was quickly dispelled for riders straining up Willey's roller-coaster hills.

The author grew up bicycling around Bedford, Iowa. A frequent contributor to SMITHSONIAN, *she lives near Rome, is co-author of a book on the Appian Way.*

Beating the heat of August's "good corn weather" sparked occasional takeoffs as early as 2 A.M.

rowed and then wrecked in the rapids of the Turkey River. On one townless 39-mile stretch of road, startled bikers found everything from a hot dog stand trucked out to the wilds to members of the Sertoma Club of Council Bluffs staked out with an even ton of watermelons, 500 brownies and 200 bags of peanuts. A Mr. and Mrs. Wilber Hubbard went through 20 loaves of bread for minced ham sandwiches and didn't intend to charge, but "people just started puttin' money in the cup."

Elsewhere en route the Dumont town fire truck dispensed free showers from its hose. In Perry, Mr. Orville Torbert invited 20 tenters into his yard for the night and offered them his shower. An unnamed farmer outside of Elkader opened his barn during a downpour and about 100 bikers crowded in. "He even went and got a ladder so more people could climb up into the hay mow," one rider reported.

Excited kids abandoned *Sesame Street* to ride their own bikes out to the edge of town to watch the fun, or lined up on the roadside in sweltering heat to toss refreshing pails of water at riders. Now and again a total stranger gets swept up in the event; a few years ago two young students on a cross-country ride from California wheeled into Iowa intending to visit friends in Fort Dodge. Approaching U.S. 20 they were suddenly confronted by a highway patrolman yelling "turn left, turn left." Mystified, they obeyed and found themselves surrounded, engulfed, in RAGBRAI. Riders were everywhere. People lined the sides of the road offering lemonade. "We'd been in places where no one even heard of people pedaling across country," the travelers said later. "Then we got to Iowa! Weird."

It's even more weird when you consider that the whole thing started almost as a gag back in 1973 when a *Des Moines Register* copy editor, John Karras, suggested to columnist Donald Kaul that he ride his bike across the state and write a few columns about it. Kaul agreed, if Karras would ride too. Then they decided to "invite a few friends and anybody else who'd like to

Tooling out of Glenwood at beginning of ride, fresh and jaunty throng pedals into the countryside.

Here, silhouetted against the rising sun, a frieze of cyclists glides through Boone County, near Perry.

go along." Very casually they laid out a six-day route from Sioux City to Davenport, made a few motel reservations, and were absolutely astonished when they got to Sioux City to find about 300 eager bikers camped out waiting to join the fun. Among them was 83-year-old Clarence Pickard from Indianola. Clarence had just bought himself a Schwinn girl's bike "because it was easier to get on," wobbled briefly around a parking lot, and retired to bed proclaiming himself ready. Clarence and his silver-colored pith helmet were the stars of that first ride, even though at one point Clarence made a wrong turn and was spotted by a *Register* reader pedaling all alone on the eastbound shoulder of Interstate 80. Plucked from this perilous position and set back on course, he finished the route.

There had been no thought of a second ride, let alone an annual event, until the mail came rolling in to the paper: "You bums, you didn't give any advance notice so I could schedule my vacation. . . ." "Why did you hold the ride the first week of school? I'm a student and I wanted to go." By public demand there had to be another ride. It began on August 4, 1974, in Council Bluffs on the Missouri River with 2,700 eager volunteers instead of the 300 of a year before. There were so many of them they all but ran down the Council Bluffs police car that led the mass start. Before they left the dusty campground, somebody had the fine idea of dipping the back wheels of the bikes into the Missouri River, and a tradition was born. Now each year the back wheels are solemnly dunked, and at ride's end the front wheels are baptized in the water of the Mississippi. The Missouri is a particularly vagrant river (one of my favorite Iowa childhood memories is an engineer friend of my mother who told us he had spent one half of his life building bridges across the Missouri, the other half trying to keep the Missouri under the bridges), and so most "river towns" are high and dry, well above the floodplain. This problem is solved by hauling water from the Big Muddy and putting it into horse tanks for the preride ritual.

Two couples from Fort Worth sun themselves and their laundry at Webster City campground.

By 1975 the ride was officially christened RAGBRAI (pronounced RAG-bray) and it had become an annual event with a minimum of 3,500 riders from all over the United States and half a dozen foreign countries. And it was organized. Troopers from the Iowa Highway Patrol joined *Register* representatives in riding the route at least twice to select the best roads, and called on mayors and chambers of commerce en route. Arrows and signs were set up so nobody could stray onto I-80 again, and troopers, local police and sheriff's deputies saw riders safely across any dangerous intersections. Bicycle repair trucks accompanied the riders, and ambulances and their technicians did a brisk business in sunburns, cramped muscles, saddle sores and "road rash"—what you get when you fall off a bike and skin yourself from head to foot. Now and again there is a broken bone or a concussion, and last year an ambulance crew had to rescue Shadow, a female black Labrador who had panted 35 long hot miles before she succumbed to heat exhaustion. A few years back, a fellow who announced he would drink one beer in every saloon he passed was overcome a full 250 miles from the end of the ride and the last saloon.

Because riders start any time they want, and ride at any speed, they tend to get strung out all along the route—which on a long day can be 100 miles. The *Register* provides two "sag wagons" which cruise behind the queue, picking up stragglers too pooped to pedal or surprised by the fact that Iowa is definitely not a flat state. Hills and headwinds regularly take a higher toll than saloons and heat.

On the first ride the paper sent a truck carrying a hot-air balloon to entertain riders and natives each night with a balloon ascension, but those simple days are gone forever. Nowadays there is so much commotion with planned entertainment in parks and schoolgrounds and local theaters, impromptu songfests, dancing in Main Street, that RAGBRAI carries no crowd-pleasers except its participants. Portable toilets are set up at each overnight stop. The paper provides a fleet of trucks to carry bikers' baggage and tents—more than 50 tons of them last year—and an unholy scramble ensues as bikers straggle into town and attack the mountain of bundles looking for their own.

The only real RAGBRAI peril now is, in fact, that it is too popular. Tandem bikes for Mom and Dad, bikes with trailers for Junior, family campers for convenient overnight stops, have been joined by about 500 cars which trail along carrying friends or part-time riders who change places driving and pedaling.

Last year there were more hangers-on than usual, and some charges of sex and pot and rowdies ruining the ride. Things did threaten to get out of hand in Elkader. Beer-drinking locals and riders swarmed so thickly in the downtown area that traffic couldn't move and police had to close Iowa State Highway 13. Then three nude bicyclists did a two-wheeled streak through the crowd. Most everybody else kept his cool. Rider-writer Kaul blamed the mini-commotion on a fellow journalist who had exaggerated the sex-and-pot diversions of the ride. "Ragbrai," he insisted, remains "still mostly biking and lemonade."

The *Register* tries quietly to limit the numbers, partly by limiting the baggage tags it will issue for accompanying freight. The man who set the whole thing in motion, John Karras, admits he has nightmares in which a government agency takes over RAG-

Ride's-end custom, dipping front wheel in Mississippi, is rendered freely by Californian Leroy Scheppmann.

BRAI and turns it into a patrolled, registered, regimented and protected event to which nobody at all comes. His nightmare is most unlikely to come true when there are Clarence Pickards around, or Gary Nelsons. Gary, who will be 19 this summer, has spent all his past five birthdays riding in RAGBRAI. He hails from Carthage, Illinois, and calls it "a consuming . . . total vacation. The best thing is, it's impossible to think of home."

For Padraic Keating of County Cork, Ireland, pedaling away last year on his first trip to the United States, it was "a magnificent example of hospitality" and a chance to see "the best side of Americans."

Mostly it still is Iowans meeting Iowans, and a yearly love affair with some hamlet hardly anyone ever heard of which knocked itself out for the great occasion. Last year it was Cooper, Iowa (pop. 51), where riders were met with a one-cannon salute on the edge of town, a loudspeaker blaring "This land is your land," refreshments, souvenir buttons and dancing in the streets (well, street).

It was somewhere around Cooper that David Moss of Marshalltown dropped $80 in bills folded inside a personalized check and clipped with a bobby pin. Laura Holtz found the money and Sheriff Kenneth Bolz roared off four miles out of town to chase down the biker and return the money he didn't even know he'd lost. "Fifty-one people are enough," wrote Donald Kaul, "if they're the right 51 people."

And that, folks, is what RAGBRAI is all about.

It's all there in this painting by Polly Kemp, of Tipton, whose son Timothy, a veteran of six rides, asked her to celebrate his RAGBRAI experiences. He gave up a European tour in order to participate.

On behalf of the Westminster Collectors Society
you are invited to acquire

The Royal Wedding

a magnificent Collection of truly valuable First Day Covers

First Day Covers shown smaller than actual size of 4⅛ by 8⅛ inches.

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Each First Day Cover will feature a bouquet of blossoms native to the issuing nation, created by two of Britain's gold-medalist artists.

The Cipher interweaves Charles' and Diana's initials in a regal design. It was created by British artist Jeffery Matthews, a favorite of the Royal Family.

THE WESTMINSTER
COLLECTORS SOCIETY

Focus of faith, witness to the march of history, the great cathedral of St. Paul in London is a living symbol of the greatness of Britain. On July 29, 1981, the eyes of the entire world — including the Commonwealth of Nations on which the sun never sets — will be focused on this site for the historic wedding of Charles, Prince of Wales, and the Lady Diana Spencer, descendant of King Charles II.

Nearly fifteen centuries and fifty-four generations separate the Royal Couple from England's first monarchs. Yet, on their wedding day, Prince Charles and his bride — like every Royal Couple before them — will forge a new link in the continuity of the Throne.

This occasion is significant, indeed. There may not be another event of this grandeur for generations. Surely, *The Royal Wedding* is an event which you, your children, even your grandchildren will want to remember *always*.

A PHILATELIC CELEBRATION OF THE ROYAL WEDDING

In honor of the wedding of Britain's future monarch and his future queen, more than fifty members of the Commonwealth will join together to preserve the pageantry and tradition of the grand celebration in an international series of stamps.

Significantly, the scope and concept of this collection are *unparalleled* in philatelic history. For, *never before* have so many nations cooperated to issue a series of stamps which, when viewed as a collection, capture an event of this magnitude.

From elegant floral bouquets . . . to royal yachts and portraits of the entire Royal Family . . . the panorama of stamps will honor *The Royal Wedding* with topics as historic as the Commonwealth countries themselves.

Of special interest, many of these beautiful stamps are being issued in their country's *highest stamp values*, making the total collection of stamps an especially significant philatelic tribute to *The Royal Wedding . . . and one of genuine value*.

ELEGANT FIRST EDITIONS

The unprecedented nature of this tribute to *The Royal Wedding* makes your opportunity to acquire *first editions* of these stamps extremely significant. For the first editions — the First Day Covers — will be only a small fraction of the total number of stamps sold to the public.

Moreover, First Day Covers of the individual stamps marking *The Royal Wedding* will be available *only* on the exact day the stamps are first issued and never again. In many countries, the First Day of Issue will be July 29, 1981, the precise day of *The Royal Wedding*.

The Royal Wedding stamps will be issued by the Westminster Collectors Society, in one complete collection of more than fifty First Day Covers. Established under the auspices of Fleetwood, America's oldest purveyor of First Day Covers, the Westminster Collectors Society encourages a greater appreciation of British and Commonwealth culture and history.

To prepare for a collection of this importance, three noted artists have been steadily at work since 1979. Each First Day Cover will bear a *Cipher* of Charles' and Diana's initials interwoven in an elegant design, and the issuing country's name painstakingly hand lettered in beautiful calligraphy by noted British artist Jeffery Matthews.

Matthews' artistry is especially favored by the Royal Family. He is, indeed, well known in Britain and throughout the world for distinctive stamp designs he created for *The Royal Wedding of Princess Anne, The Queen Mother's Birthday* — and stamps, Official Souvenir Booklet and First Day Covers he created for the historic *Queen's Silver Jubilee*.

In addition to Matthews' beautiful contributions to *The Royal Wedding* collection, the First Editions will bear original works of art created exclusively for the collection by stamp designers and gold-medalists Kristin Rosenberg and Leonora Box, two of Great Britain's best-loved artists.

Each of the works for *The Royal Wedding* collection will depict a lovely floral bouquet of blossoms native to the stamp-issuing nation, tied with ribbons in the country's national colors.

AN EXCELLENT VALUE

The Royal Wedding collection will be issued solely for subscribers, and the total number of collections will be forever limited to the exact number of original subscriptions postmarked not later than July 29, 1981 . . . the very day the world will witness Charles' and Diana's wedding vows.

Each subscriber will receive the First Day Covers of *The Royal Wedding* at the convenient rate of three per month, beginning in September, 1981. The modest issue price of only $19.50 per month will be guaranteed for the entire collection. *In view of the high denomination of the stamps,* the elegant designs by artist Jeffery Matthews, and the beautiful works of art by Kristin Rosenberg and Leonora Box, *this is an excellent value.*

Past British First Day Cover collections honoring events of this magnitude have sold out rapidly. And, after July 29, 1981, *The Royal Wedding* collection will never be available again except from those collectors who acquired it at the time of issue.

Moreover, as a convenience, collectors need only pay for the first month's shipment now, or charge it to their credit card.

Collectors who acquire *The Royal Wedding* collection will also receive, without additional cost, a lavishly bound Album.

Your collection will include a custom-made Album to protect and display your Covers. It is yours at no additional cost if you subscribe now.

WORLDWIDE DEADLINE: JULY 29, 1981

You have this special opportunity to acquire *The Royal Wedding* collection. Please remember that this is the *only* time this collection can be issued. To take advantage of this historic opportunity, you must postmark your application no later than July 29, 1981, and mail it directly to Fleetwood, One Unicover Center, Cheyenne, Wyoming 82008-0001, under whose auspices the Westminster Collectors Society was established.

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The Royal Wedding

First Day Cover Collection
All applications must be postmarked by July 29, 1981, the final worldwide deadline

Fleetwood
Cheyenne, Wyoming 82008-0001 C2

Please accept my subscription for *The Royal Wedding* First Day Cover collection which will consist of approximately 57 beautifully prepared Covers to be sent to me at the rate of three per month beginning in September, 1981. The total price of $19.50 per month is guaranteed for the entire Collection. A handsome Collector's Album will be sent to me at no additional cost.

I prefer to pay as follows:

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The Westminster Collectors Society was established under the auspices of Fleetwood, America's foremost purveyor of First Day Covers since 1929. Fleetwood is a division of Unicover Corporation.

By Esin Atıl

As bodyguards or rulers, Mamluks made a golden age

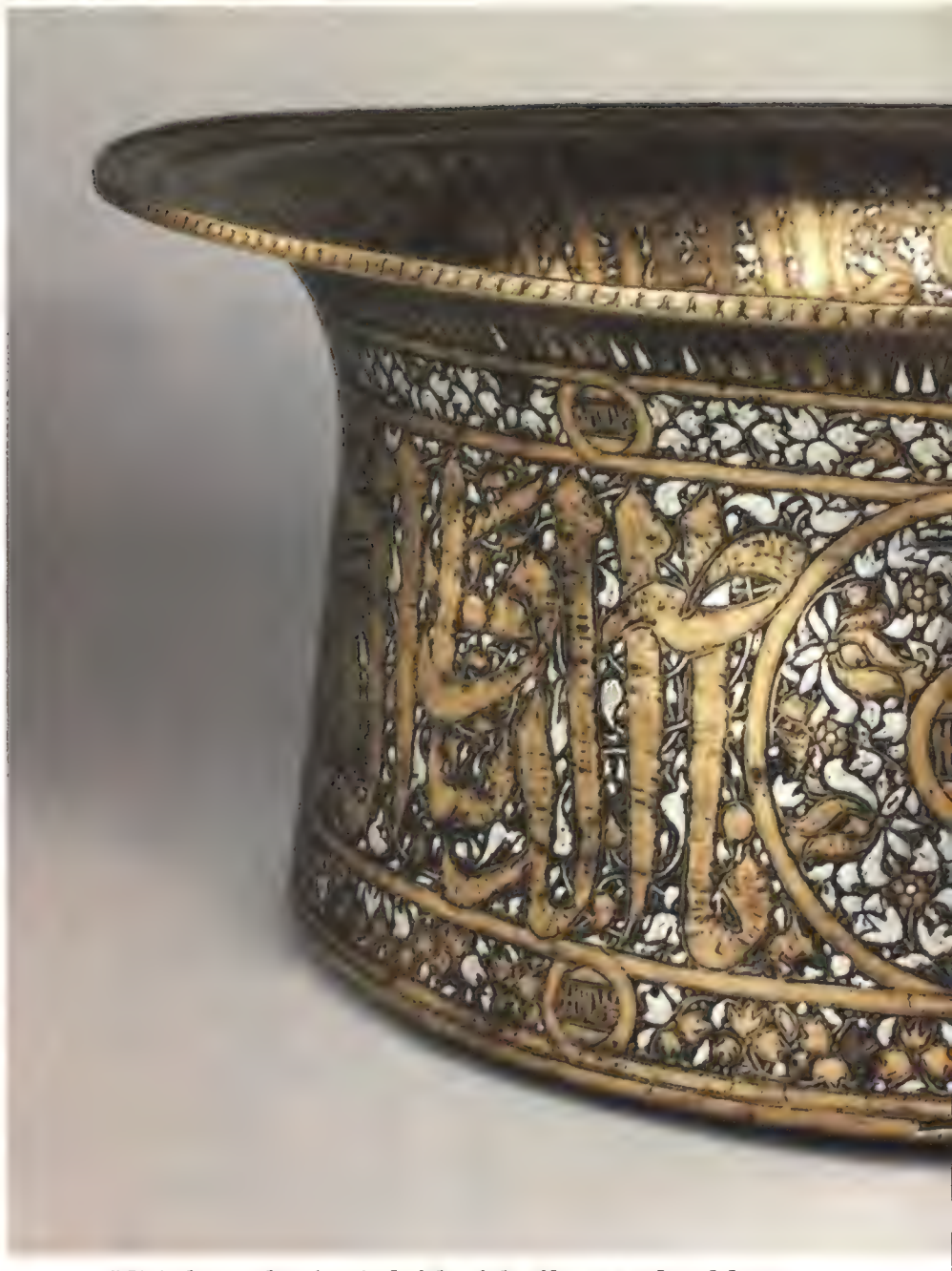
Creators of a great empire that stretched all the way from Egypt to Syria, they fostered opulent renaissance of Islamic art

The Mamluks created in Egypt and Syria one of the most formidable empires of the Middle Ages—it lasted for more than 250 years—but they were neither Egyptians nor Syrians. They were newcomers to the Near East, brought in from outside the Islamic world, as bodyguards. The word *mamluk* derives from the verb "to own" in Arabic, and refers to those who were purchased, captured or obtained as gifts or tribute.

Yet so energetic were they, and such aggressive warriors, that their empire extended from southeastern Anatolia through Syria and Palestine and the Hijaz in Arabia to parts of the Sudan and Libya. During the formative years of the empire the Mamluk armies defeated the hitherto indestructible Mongols, halting their devastating advance into the Islamic world; expelled the last of the Crusaders from the Near East; and crushed the fearsome sect of the Assassins, which was systematically eliminating the ruling classes.

At the same time, the Mamluks concentrated on filling their treasury with revenues from improved agricultural methods and from a lucrative trade in products which passed either by sea from the Indian Ocean and the Red Sea, or overland across Syria. By the beginning of the 14th century the empire was politically secure, its economy flourishing. Cairo, the capital, became the wealthiest city in the Near East and the center of artistic and intellectual activity. For the Mamluk sultans were among the greatest patrons of art and architecture in the history of Islam, and presided over what was, in effect, a golden age.

The British Museum, London



This brass basin, inlaid with silver and gold, was made for Sultan Nasir al-Din Muhammad circa 1330.

Impressive by the standards of any time, their cultural and artistic achievements make up an opulent legacy. They endowed hundreds of religious complexes in the capital and provinces, supplied them with magnificent Korans, precious metalwork, glass objects and carpets. They built fortresses, roads, bridges, markets and inns throughout the empire, and reconstructed the sacred monuments in Syria, Palestine and the Hijaz. They became the true defenders of the faith, protected the caliphate, and zealously guarded the holy cities of Mecca, Medina and Jerusalem.

Americans now have their first opportunity to see a major survey of the art of the Mamluk era (1250-1517), 128 objects on loan from 19 worldwide collections. "Renaissance of Islam: Art of the Mamluks" was organized by the Smithsonian Institution Traveling Exhibition Service (SITES) for a two-year national tour. Having opened in Washington in mid-May, it now goes to the Minneapolis Institute of Arts, August

Text in center of medallion, enclosed by lotus blossoms, reads "Glory to our master, the sultan."

15-October 11; the Metropolitan Museum of Art in New York, November 7-January 3, 1982; and later to the Cincinnati Museum of Art, the Detroit Institute of Arts, the Phoenix Art Museum, the Wadsworth Atheneum in Hartford, and two more locations yet to be announced. The exhibition has been funded jointly by United Technologies Corporation and by SITES and the museums participating in the tour.

Coinciding with the loan exhibition is a smaller one at the Smithsonian's Freer Gallery of Art, consisting of nearly 30 Mamluk objects from its own collection. This will be on display indefinitely.

The tradition of owning—literally—an elite corps of bodyguards can be traced to early Islamic history, when the caliphs of Baghdad began acquiring Mamluks. They were at first drawn exclusively from the Turkish tribes of Central Asia, but later mostly from the Caucasus. The fact that they were chattels who had nothing to lose, and whose existence was dependent on how well they served their owners, made them indispensable to the rulers, who could not rely upon the loyalty of their own subjects and who feared the rivalry of their own relatives.

The Mamluks were given superb training in warfare and horsemanship. After completing their education, they either entered various corps as pages or were employed in the household of the sultan. They were later freed and given specific offices that entitled them to have their own Mamluks. The amirs, or freed Mamluks, rose rapidly within the system; in time, the more ambitious ones often usurped the throne and became sultans themselves.

This, in fact, is the history of the Mamluk empire. It begins in Cairo, where the sultan Najm al-Din Ayyub stationed his Mamluks on the island of Roda in the Nile. They were known as Bahri (the sea), and it was the leaders of this group who established the empire. Any account of its founding reads like a medieval romance, full of violence and feminine intrigue. When the sultan died in November 1249, his widow—an enterprising lady named Shajar al-Durr (Tree of Pearls), who had formerly been in the harem of the caliph of Baghdad—concealed the news of his death. She ruled by herself for several months until his son and heir, Turan Shah, could arrive from Mosul.

When Turan Shah finally arrived in Cairo, he promptly—and briefly—ascended the throne; he was greatly disliked and was murdered within two months, ending Ayyubid rule in Egypt. The Bahri Mamluks elected Shajar al-Durr as their sultana and appointed an amir named Aybak as her commander in chief. Thus, the Mamluk state was born, in May 1250, with a woman on the throne.

The caliph in Baghdad, however, was reluctant to see as ruler of Egypt a woman who had once belonged to him. And so it was decided that she should marry the commander in chief, Aybak. She abdicated the throne in his favor after having reigned only 80 days. Seven years later Aybak made the fatal mistake of offering to marry the daughter of the ruler of Mosul, thereby incurring the wrath of Shajar al-Durr. The queen subsequently lured him to her chambers and murdered him in his bath. She met an equally gruesome death herself three days later at the hands of Aybak's vengeful concubines, who beat the queen to death with their clogs and threw her body from the walls of the palace.

The Bahri chapter of Mamluk history actually begins with Baybars I in 1260, who defeated the Mongols in Syria and captured the Crusader fortresses from

Dr. Atıl is curator of Near Eastern art at the Freer Gallery. She is the editor of Turkish Art *(S. I. Press and Harry N. Abrams, Inc., 1980).*

National Library, Cairo

Frontispiece of a Koran donated by Sultan Shaban II in 1369 to a school built by his mother.

Caesarea to Antioch. He formulated a strong administrative system which enabled the sultanate to resist external and internal crises until the 16th century. Baybars also brought to Cairo the last Abbasid caliph, whose court in Baghdad had been destroyed by the Mongols, thus giving his capital the prestige of becoming the seat of the caliphate.

Baybars was the epitome of the chivalrous, energetic and enlightened sultan. He moved back and forth throughout his empire with the speed of lightning, reconstructing fortresses, roads, bridges and canals; inspecting the army and the navy; checking his subordinate fiefs. He established a regular postal service between Egypt and Syria that had twice-weekly pick-ups and four-day delivery; even so, Baybars found this method of communication too slow and often relied on carrier pigeons. A legend in his own time, Baybars died at the height of his career in 1277 after drinking a cup of poisoned fermented mare's milk.

With the reign of Qalawun (1279-90), the Bahri Mamluk empire reached its apogee. Qalawun established a dynasty: 14 of his descendants, from sons to great-great-grandsons, ruled until 1390. His illustrious younger son, Nasir al-Din Muhammad, although deposed twice, spent more than four decades on the throne in three separate reigns (1293-94, 1299-1309 and 1310-41). With his treasury overflowing with revenues from trade and improved methods of agriculture, he could well afford to be the greatest Mamluk patron of the arts, commissioning magnificent palaces and mosques and ordering spectacular objects for both secular and religious use—manuscripts, brasses inlaid with silver and gold (pp. 108-9), glass vessels embellished with enameling and gilding, and sumptuous silks woven with metallic thread. His amirs competed with the sultan. Together, they stimulated artists and architects to achieve the highest technical and esthetic perfection during the first half of the 14th century.

Arrival of the Burji Mamluks

The descendants of Nasir al-Din Muhammad continued to be patrons of the arts. One of the greatest in that respect was Sultan Hasan (1347-51 and 1354-61), who was renowned for his madrasa (school) and mausoleum decorated with carved stone and stucco walls, marble revetments, inlaid metal doors and hundreds of enameled and gilded glass lamps (p. 112). Shaban II (1363-76) was responsible for the most gloriously illuminated Korans (left), some of which were produced as 30-volume sets, while others were oversize single-volume books, as much as three feet high.

In 1382 the last Bahri Mamluk sultan was overthrown in an uprising led by an amir named Barquq, who established the Burji Mamluk rule (from *burj*,

Musee du Louvre, Paris

Detail of an inlaid brass bowl made by Ibn al-Zayn circa 1290-1310. Medallion depicts Mamluk rider.

meaning tower, a reference to the citadel in Cairo where these Mamluks were quartered).

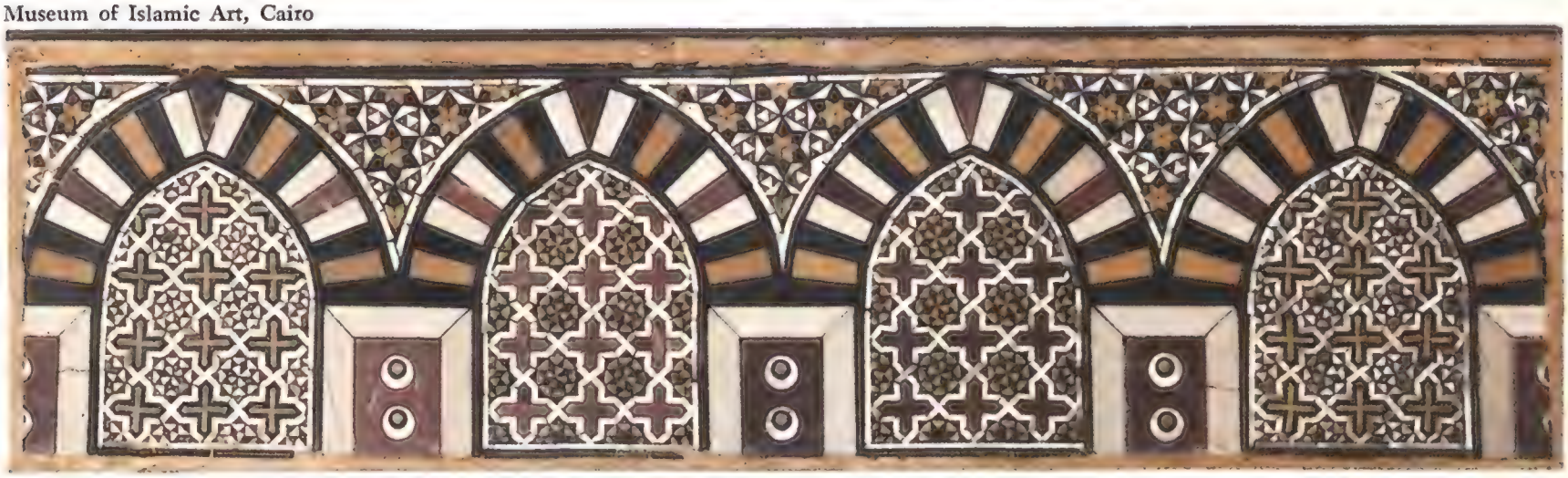
The fortunes of the empire began to wane in the 15th century. Corruption among the amirs, inadequate collection of taxes, loss of trade revenues, famine and pestilence all took their toll. There were sporadic attempts at revival. The last of the great Mamluk sultans was Qaitbay (1468-96), during whose reign the magnificence of the Bahri period was recaptured. An avid builder, Qaitbay endowed numerous religious and secular buildings and commissioned many manuscripts for his personal library. His interest in supporting the arts was matched by that of Qansuh al-Ghuri (1501-16), a scholarly man who came to the Mamluk throne at the age of 60. But his reign was troubled by the decadence, rivalry and corruption that frequently occur toward the end of mighty empires.

Commerce was now lost to the Portuguese, who controlled the trade route around the Cape of Good Hope, bypassing the Mamluk ports. The cost of maintaining the army had become a great burden. The treasury was virtually empty when the Ottoman Turks, led by Sultan Selim I, entered Syria. The Mamluks were outnumbered and overwhelmed by the superior artillery and military discipline of the enemy. Cairo fell in January 1517 and Selim I was recognized as its new ruler. Egypt and Syria, as well as the Hijaz, became Ottoman provinces, and Istanbul took over as the seat of the sultanate and the caliphate. Even so, the Ottoman conquest did not radically change the administrative system established by the Mamluks. Egypt and Syria were still ruled by a powerful elite of outsiders, and the Ottomans relied on the Mamluks to run many bureaus.

Although the Mamluk state had been continually shaken by rivalries among the amirs, who resorted to treachery and assassination to gain the throne, it was nevertheless stable enough to survive for two and a half centuries. Its strength (and weakness) lay in the institution of the Mamluks, which created an elite military oligarchy and enabled an individual to rise from the ranks of one who was owned to supreme rule. The amirs kept their quarrels to themselves and did not permit any interference from natives or foreigners, thus retaining a solidarity in the face of internal and external attacks.

At the head of the oligarchy was the sultan, a Mamluk by origin. He was surrounded by a group of high-ranking amirs, also former Mamluks. This ruling class constituted the *arbab al-suyuf*, men of the sword. The

Museum of Islamic Art, Cairo



Inlaid panels of colored marbles and mother-of-pearl were used in Mamluk buildings; 15th century.

sultan had a group of Mamluks who served as his bodyguards and held specific offices in the palace. When these imperial Mamluks were freed and became amirs, they were sent as governors and commanders to the provinces or given prestigious positions in the capital. The amirs had their own Mamluks who could be freed or passed on to the imperial household. They were also allotted fiefs, which might be estates, towns, villages or the revenues from taxes and customs duties.

The next class, called the *arbab al-qalam*, men of the pen, was drawn from natives, free-born Muslims, sons of former Mamluks born and raised in the Islamic world, and a few local Christians and Jews. They held civil offices and served as secretaries, judges, clerks and teachers.

The offices held by the amirs were identified by blazons (coats of arms), which are unique to the Mamluk world. Although heraldic emblems had been employed by other Turkish states, these were generally symbols of royalty or indicated specific tribes and did not develop into a hierarchic system. Among the Mamluks the blazon identified a specific office and was used only by the amir who held that post. Everyone in his household, including his Mamluks and women, could use this emblem. It was placed on his houses, palaces, mosques and mausoleums; applied to his boats, tents, baggage, banners and blankets; and used on his garments, arms and armor, and household goods.

The Mamluk word for blazon was *rank*, which means "color," indicating that color played an important role in the signs. The emblems, enclosed by a shield, might be animals, flowers, epigraphy or signs of office. The first sultan to use an animal was Baybars, who chose a lion. It was also used by his son and heir, Baraka Khan. The single- or double-headed eagle is thought to identify Nasir al-Din Muhammad. The fleur-de-lis, the six-petaled rosette and crescent were associated with the house and dynasty of Qalawun.

Signs of office symbolized the function of the bearer in the court of the sultan and identified the amirs who held these important posts. Thus the cup was used by the *saqi*, cup bearer; the table by the *jashnigir*, imperial taster; the pen box by the *dawadar*, secretary; the ewer by the *tishtdar*, superintendent of stores; the polo stick by the *jukandar*, polo master; the drum by the *tabldar*, drummer in the military band; and so on.

The Mamluks established a remarkable administrative and military system that withstood foreign invasions, internal strife and economic crisis. Adopting Islam with the fervor of converts, they expressed their piety by constructing elaborate religious complexes and supplying them with generous endowments and exquisite furnishings. They flaunted their wealth by living in luxurious surroundings filled with elaborately decorated objects. Their political ambitions and fierce competition for power were a boon to artists, for each sultan and amir strove to outdo his predecessors by endowing more magnificent buildings and commissioning more spectacular objects. The age of the Mamluks saw the renaissance of Islamic art in the Arab world, and the culmination of its artistic genius in the ultimate expression of indigenous traditions.

Museum of Islamic Art, Cairo

Lamp, of gilded and enameled glass, was ordered by Sultan Hasan for his religious complex in Cairo.

The rulers of Yemen sought out works from Mamluk artists, including this bottle, circa 1300-1320.

The Detroit Institute of Arts

HOUDINI

LE MAÎTRE DU MYSTÈRE

GRAND ROMAN-CINÉMA

Adapté par

Mr J. PETITMUGUENIN

ÉDITÉ PAR

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MUNDUS FILMS
FIRST NATIONAL EXHIB
CIRCUIT

By Erik Barnouw

Magicians created 'living pictures,' then rued the day

So artful were the illusions in early trick films that moviegoers promptly lost interest in flesh-and-blood showmen like Houdini

Jaws, The Towering Inferno, Star Wars (SMITHSONIAN, April 1978): in today's cinema spectaculars we have come to take screen illusions for granted without realizing that the origin of "living pictures" themselves as well as their fantasy scenes—a shark devouring a swimming child, fire consuming victims trapped in a burning high rise, spaceships careening in explosive combat—lies with the 19th-century's King of Entertainment: the magician.

In special magic theaters like London's Egyptian Hall ("England's Home of Mystery") or on Grand Tours, the magician astounded; his shows were high spots of family trips. He turned a man into a skeleton, then back into a man. A woman disappeared in a puff of smoke, or she was burned alive on the stage, to arise presently from her ashes. The shows included robots who could play the violin or read people's minds. Thanks to the creative use of well-named "magic" lanterns, there were fantastic "illusions" like rocket trips to the moon, descents into hell, and visits to mermaids under the sea. The magician let you know it was all skill, aided by science, nothing supernatural, no sorcery—but you could believe what you liked.

As a final sensational climax, there might be a decapitation. The magician cut off somebody's head and placed it on a tray or table. Then he would go to attend to the headless body. Meanwhile the severed head would suddenly open its eyes and start to talk. This was called, long before television, the "talking head."

As the technology of optical equipment advanced, so did the magicians' use of projected images. With the advent in 1895 of a machine that projected a rapid flow of images from film, magicians on every continent suddenly added a new and astounding attraction—the miracle of the century, the wonder of the world—living pictures. It soon dominated all other wonders.

By adapting to film their peculiar heritage of technical hanky-panky and finding new opportunities for it, magicians eventually became more important as film creators than as performers. They played a pioneer role in animation and they set in motion the "trick" film, which laid the foundations for the field of special effects in the modern cinema. *Star Wars* derives its genesis from the 1902 *A Trip to the Moon.*

Georges Méliès, a Frenchman, was one of the best and earliest magician/film makers. In his very first year of living-picture production—1896—he made *Vanishing Lady.* Sudden disappearances, like ghosts, had a hallowed tradition in stage magic; vanishings could involve anything—watches, elephants, rabbits—but especially honored was the Vanishing Lady. Perhaps sensing that a disappearance on film might not have the impact it had on stage, Méliès added a detail. The lady did not merely vanish, she turned into a skeleton.

The ultimate headache

By 1902, Méliès' film tricks had become more sophisticated. In *The Man with the Rubber Head* we see a "scientist" conducting an experiment on a replica of his own bald head (p. 118). He attaches a hose to the head and inflates it. The replica gasps and sputters as it swells. The experimenter, having tested the procedure to his satisfaction, lets an assistant take over, but the assistant pumps too vigorously, and the hugely inflated head explodes, smashing half the laboratory. To portray the inflating of the head, Méliès' own head was photographed. He was seated in a chair which was dollied toward the camera, which was focused on the head with the lower part of the body masked. This series of images had to be superimposed, with the necessary masking, on footage of the pumping procedure.

In another of Méliès' exuberant decapitation films, *The Terrible Turkish Executioner,* four doomed prisoners are brought before a public executioner. A plank with four holes, a sort of stock, is placed over their heads. The executioner lops off all four heads with his huge scimitar. The headless bodies sit down together. The executioner dumps the severed heads

Dagger-wielding robot threatens a shackled Houdini on 1910s poster touting movie serial. The magician hoped it would reattract his film-enraptured audience.

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A grotesque Arctic monster clutches hapless human explorers in film fantasy, *The Conquest of the Pole*, made in 1912 by special-effects pioneer Georges Méliès.

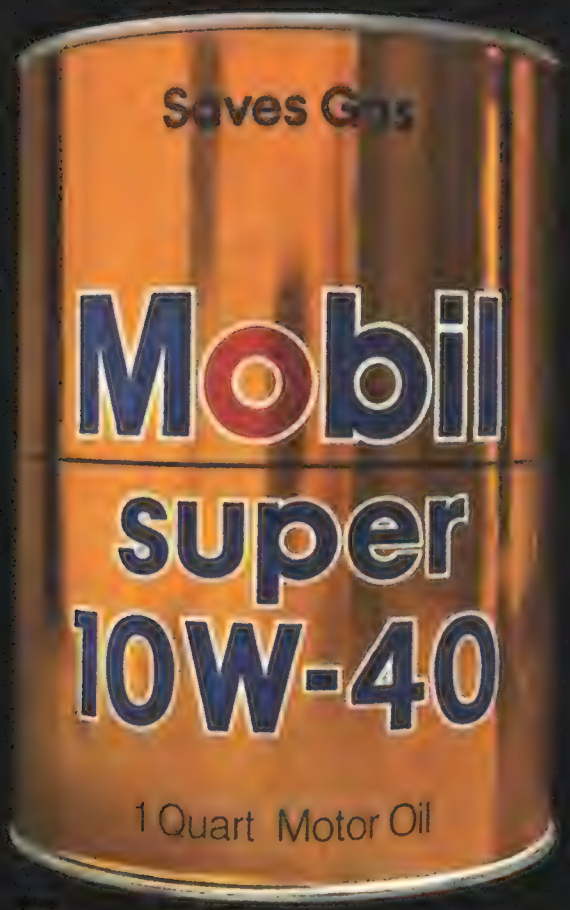
into a barrel and goes back to his lunch. But one head floats up from the barrel and finds its body. Springing to life, that prisoner helps the other heads reunite with their respective parts. The executioner takes alarm and rises. But the prisoners have his great scimitar and with one swing divide him at the waist. The following moments, in which the severed upper half of his torso, wriggling on the floor, tries to "put on" the lower half—like a child learning to put on his pants—form a classic sequence of the trick film. The effort succeeds; the executioner springs to life and pursues the prisoners. Chorus girls dance in for a finale.

One pleasure in these "cheerful mayhem" films done in the magic tradition of dismemberment seems to lie in the repudiation of all physical restrictions of human existence: a severed head on a tray could engage in witty banter, severed limbs could reassemble and spring to life. It was macabre but cheerful; it made humans wildly omnipotent through the skillful use of composite images and complex superimposures, with precise masking to achieve perfect fit. Maskings often had to change from frame to frame. Careful calculations were needed to ensure the correct proportions of the various images.

Nowadays many people find it difficult to think of film in the context of magic. But the first viewers had no trouble on that score. As trains rushed by them, and living images of king, Kaiser and maharaja walked before them, they knew they were seeing things that could not be. Today, having come to accept such things as "reality," we have lost the magic of them. They knew they were seeing magic.

Many 19th-century illusionists brought to their profession a zestful appetite for science. Most were grounded in ancient varieties of legerdemain, and combined them with such specialties as juggling, escapology, shadowgraphy, chalk-talk, ventriloquism, mind reading or instant-transformation acts. But they also found, in that century of prolific in-

This article is an adaptation of Oxford University Press' new book, The Magician and the Cinema.



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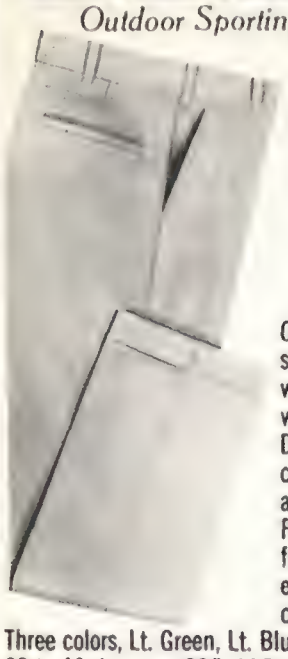

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Using cinematic flimflam, magician Méliès appeared to inflate his own head.

Head neared climactic bursting point in *The Man with the Rubber Head*, 1902.

vention, that every new scientific invention had magic possibilities. The magician made it his business to stay a step or two ahead of public understanding of science.

In the 1840s the Austrian magician Ludwig Döbler began his act by exploiting the mysteries of electricity. Walking out onto a dark stage, he apologized to the audience for the lack of illumination, then fired a pistol to "light" the innumerable candles on his stage simultaneously.

In 1845 the French magician Jean Eugène Robert-Houdin, "the father of modern magic"—whose fame was later to inspire the Hungarian-born Ehrich Weiss to adopt the name Houdini—founded in Paris the Théâtre Robert-Houdin, which showed magic for over 70 years, continuing long after his death. The theater's workshops produced a continual series of new illusions, including optical effects using multiple magic lanterns. The optical creations became especially important after 1888, when, under the ownership and management of Georges Méliès, the workshops made film history.

The magic lantern had been used for private entertainment by the well-to-do in the 17th century, but late in the 18th century it suddenly acquired a virtuoso role in public entertainment. The genius behind this development was a Belgian experimenter, Etienne Gaspard Robert, who as a showman took the name Robertson.

In his native Liège, he began to startle audiences with a bone-chilling performance called *Fantasmagorie*, which he took to Paris about 1794. In 1797—when he acquired as his setting an abandoned chapel on the grounds of an old Capuchin monastery, surrounded by ancient tombs—he scored a historic success. Audiences entered through cavernous corridors, marked with strange symbols, and came on a dimly lit chamber decorated with skulls; effects of thunder, sepulchral music, and tolling bells helped set the mood. Coal burned in braziers. Robertson gave a preliminary discourse, denouncing charlatans and their bogus apparitions and promising something superior. He tossed some chemicals on the braziers, causing columns of smoke to rise. The single lamp flickered out, putting the audience in almost total darkness.

Then, onto the smoke arising from the braziers, images were projected from his concealed magic lanterns (p. 120). They included human forms and unearthly spectral shapes. The images came from glass slides, but the movements of the smoke gave them a ghoulish kind of life. Among these

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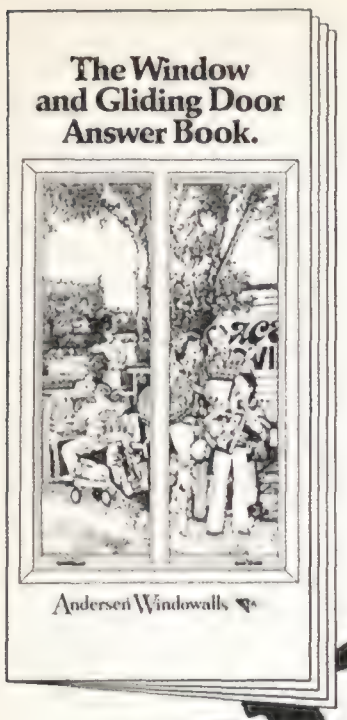

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apparitions were men and women who had died in the French Revolution, such as Danton, Marat, Robespierre. Their faces, with inscrutably changing expressions, would suddenly appear in the spirals of smoke. Some spectators sank to their knees, convinced they were in the presence of the supernatural.

Robertson used rear projection, which made it easy to keep audiences unaware of the lanterns. In addition to projection onto smoke, he developed a technique for projecting onto layers of gauze, which he soaked in wax and ironed to achieve the right translucency. The gauze was hidden from the audience at the start of the show by a black curtain, which was opened in darkness just before the projections. The audience was apparently unaware of the screen (p. 122).

An important aspect of Robertson's technique was his treatment of the slides. The area around the image was totally blacked out, so that a projected figure had no environment of its own. It seemed to hang in air. Spectators could not tell its distance from them, and sometimes reached out to it. Another aspect was that the lantern was mounted on a sliding apparatus. By moving it forward, while adjusting the focus, Robertson could make the image grow, and give spectators the feeling it was about to overwhelm them, until it was very suddenly blurred out of existence. By pulling back, he could make it shrink into disappearance. Each effect had its own dramatic possibilities and a cinematic quality.

In the United States, an imitative *Phantasmagoria* acquired indigenous aspects. In 1808 the New York *Post*, reviewing a local performance, mentioned that its "fantoms" included Washington, Jefferson, Adams, Hancock and Robert Morris. Advancement to "fantomhood" was premature in several of these cases. Such problems could be solved by use of the promotional phrase "apparitions of the Dead or Absent."

Variations have never quite died out. In his book *Magic Shadows*, Martin Quigley jr. quotes a World War II Associated Press bulletin to the effect that "Tommies manning an outpost during the night suddenly saw an image of the Virgin Mary appear in the clouds, with her arms outstretched in entreaty. The commander sent out a patrol, which returned with the information that the Germans were projecting the image from a machine

Projected on smoke, the free-floating devil and skull images literally moved.

Parisians were astounded in 1790s by "living" specters in the *Fantasmagorie*.

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Robertson projected sepulchral images from behind the wax-impregnated screen to mystify his audience, which, unable to see the equipment, gasped at phantoms.

on the ground" (February 15, 1940).

Until 1830 or so, projection effects had been fueled mainly by oil. The invention of limelight about 1820 introduced a far more powerful light that could be directed and focused. Limelight was based on the intense luminosity of a block of lime when heated to incandescence. By 1840 it was used in theaters. For the magician it opened a whole new range of optical effects and illusions, including new apparitions. Their development was associated with the magician Robin, who had his own magic theater in Paris—the Théâtre Robin—and with London's Royal Polytechnic Institution, which opened in 1838 and became the locale for spectacular lantern shows and sideshows.

Polytechnic performances sometimes made use of an enormous sheet of glass tilted at a 45-degree angle to the stage (p. 124). Through the control of light this could at one moment allow a view of whatever was behind it, and the next moment show (instead of or in addition) a different image, generally projected from below, as from an orchestra pit. The audience was not conscious of the glass sheet as such. The stage could now seem to be occupied by people actually on it, and by others not there at all. Man and ghost could seem to confront each other.

Limelight also opened another, quite different career for the magic lantern. Rear projection had been the prevalent procedure not only because it aided secrecy, but also because weak light required a short distance. Front projection from a position near the screen inevitably blocked the audience's vision. With a powerful light, projection from behind the audience, or even from a booth in back of the auditorium, became feasible. This helped the magic lantern to become the companion of lecturers, or, rather, to embark on a double life—an overt aid to lecturers, a covert tool for others including magicians and spiritualists.

The Théâtre Robert-Houdin under Georges Méliès, who had bought it as a 27-year-old magic addict, specialized in neverland narratives in exotic

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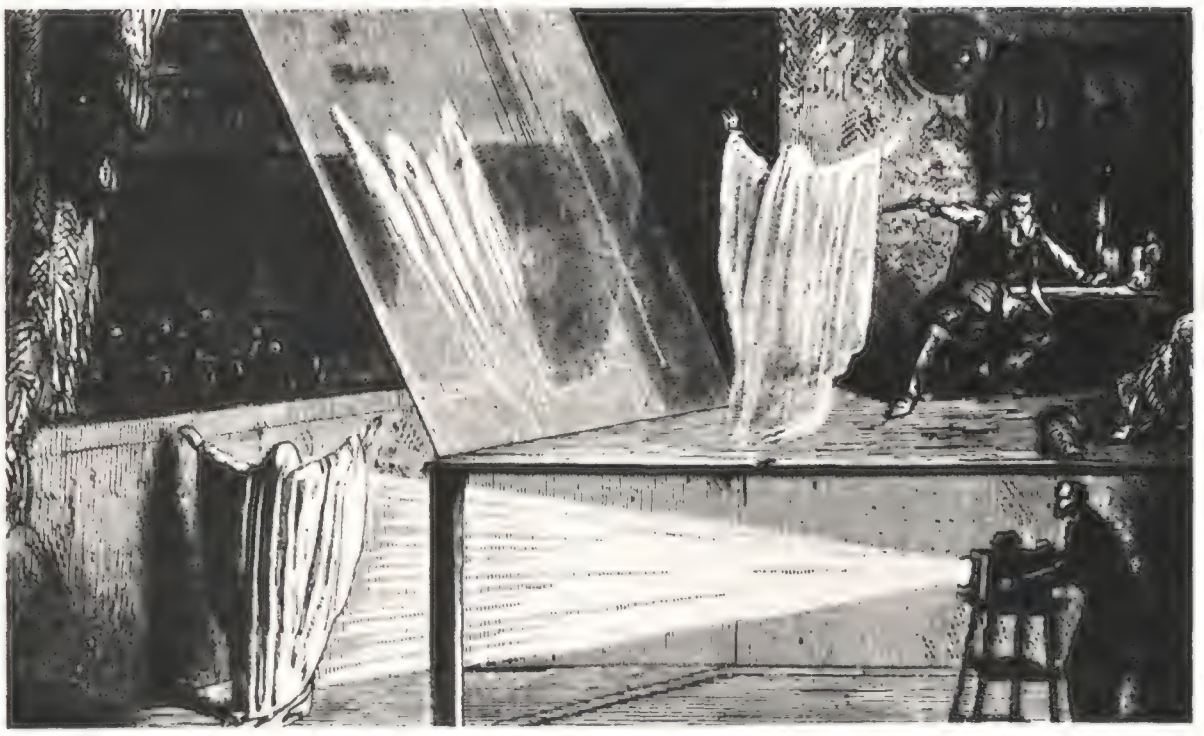
settings—moonscapes, woodland grottoes, undersea vistas, fires of hell—often combining scenery with projections from many magic lanterns. Scenes could change from winter to spring to summer to fall. They could be subjected to catastrophic storms, floods, earthquakes, hailstorms. At London's Polytechnic, use could be made of as many as 15 lanterns, operated from a booth that ran the width of the theater.

The debut of Louis Lumière's Cinématographe—a film projector which could also serve as a camera or a printing machine—in 1895 at the Grand Café in Paris signaled a chaotic scramble, a rush for wealth and glory, in which numerous magicians took part—including Georges Méliès. On April 8, 1896, Méliès began to make living pictures a regular part of the Théâtre Robert-Houdin programs with projectors and films supplied by the Englishman Robert Paul. Méliès studied the projectors and was able to design a motion-picture camera and have it fabricated by a mechanic; thus he plunged into a living-picture career that would eventually account for some 500 films. From the start he looked on his pictures as magic items to enrich—not replace—the programs of his theater, while earning additional revenue through sales to other establishments.

Simultaneously Robert Paul, who, more than anyone else, deserves to be called "the father of British cinema," entered every aspect of film: invention, manufacture, exhibition, distribution, production. He enlisted a magician, Walter R. Booth, to help him. In the flood of films that they produced, some were magic acts, like *An Overincubated Baby* (1901), in which a baby is placed in a professor's incubator—apparently for too long. He comes out an old man. A longer film, *The Motorist*, probably made in 1905, is characteristic of their later, more ambitious work. A motorist, pursued by a policeman, escapes by zooming off into space. After circling the sun he takes a ride around the rings of Saturn (p. 126), then starts falling back toward the Earth. He crashes through a roof, landing in what turns out to be a courthouse. As the forces of law move in to arrest him, the auto suddenly changes into a horse-drawn cart, which proceeds out of the courtroom. When out of the reach of the law, it changes back into an automobile and makes good its escape.

In Manhattan in 1899, Albert E.



A 19th-century magician raised ghost with his magic lantern (which was made more powerful when limelight replaced oil as fuel) and a tilted sheet of glass.

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Science joined fiction in daring drive on Saturn's rings in *The Motorist*, 1905.

Smith, a magician turned film maker, and his cartoonist partner, J. Stuart Blackton, responded to the clamor of local theaters for films of naval action in the Spanish-American War by making one in their American Vitagraph Company office. Smith gives the details in his autobiography, *Two Reels and a Crank*: "At this time street vendors in New York were selling sturdy photographs of ships of the American and Spanish fleets. We bought a set of each and we cut out the battleships. On a table, topside down, we placed one of artist Blackton's large canvas-covered frames and filled it with water an inch deep. In order to stand the cutouts in the water, we nailed them to lengths of wood about an inch square. In this way a little "shelf" was provided behind each ship, and on this shelf we placed pinches of gunpowder—three pinches for each ship—not too many, we felt, for a major sea engagement of this sort."

For background Blackton drew white clouds on blue-tinted cardboard. Fine threads were attached to the ships, to guide maneuvers. Smoke was needed, so Mrs. Blackton volunteered to smoke a cigarette, and an office boy said he would try a cigar. Wires, slender enough to escape the eye, were used to touch off the mounds of gunpowder, and the battle was on. Puffing and coughing, Mrs. Blackton delivered a beautiful haze. The explosions were terrifying.

The Battle of Santiago Bay lasted for just two minutes. According to Smith's account, film and lenses were sufficiently imperfect to conceal the crudities. It was a smash hit. Magic was giving way to motion-picture special effects.

Even that great escape artist and erstwhile magician, Harry Houdini, developed a new obsession during a European tour in 1901: to conquer the world of film. Born Ehrich Weiss in 1874, he worked as an actor, contortionist and trapezist before turning to magic. As a magician he wanted at first to be "like Houdin" and named himself accordingly, emulating some of Robert-Houdin's magic. The specialty he finally evolved—escapology—made use of all his varied skills: astounding escapes from handcuffs, straitjackets, packing cases and safes, often dangling over city streets or dropped into harbors or rivers. In 1901 he made a pilgrimage to the Théâtre Robert-Houdin, where a disturbing discovery awaited him: stage magic had vanished from the evening hours in favor of the cinema. Magicians had been relegated to the afternoons. This troubled Houdini, and that year his first involvement with film apparently began with a short item for Pathé. Years later he began a more determined assault with a 15-part serial, *The Master Mystery*—entitled in France *Le Maître du mystère*. One of the main players was a robot (p. 114) that may have been the first such character in film, a forerunner of Hollywood's infatuation with them a half-century or so later.

For magicians (including Houdini) the plunge into cinema proved an eventual disaster. Those like the American Carl Hertz, who took films to South Africa or Australia or China (in the spring of 1896 on the S.S. *Norman* he presented what must have been the first film showing on any ocean liner) as part of their magic repertoires, found, just a few years later, that the theaters no longer wanted the magic, just the film portion.

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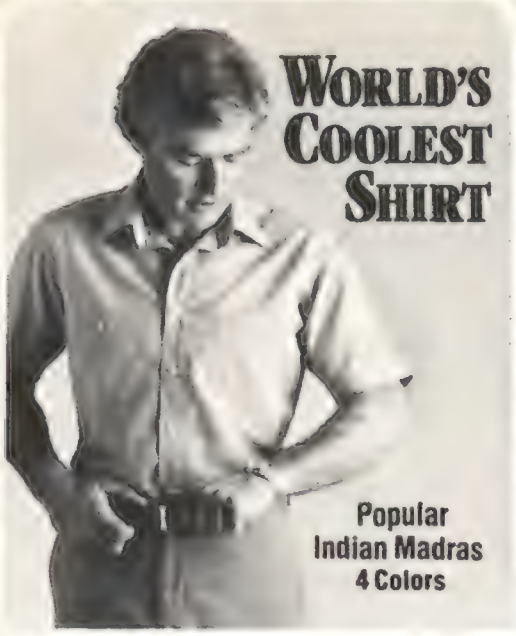

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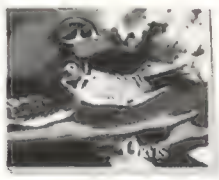

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ousting its former master. And the transfer to the screen of the magician's most sensational illusions—disappearances, bizarre transformations and beheadings—proved ultimately catastrophic. Anyone with a camera and a splicer could produce the same miracles—and did. In his films, Houdini, for example, was performing miracles such as many actors and actresses seemed able to perform in picture after picture. Decades later, in the film *Houdini* (1953), Tony Curtis could do the magic. The sensations ceased to be sensational. Even on stage they began to seem stale. The magician found he had been helping to destroy his own profession.

The public appeal of film trickery seemed to decline by 1905. Films were becoming longer, more serious, more romantic as handsome heroines and heroes became central concerns. By the mid-1920s, magic theaters were a thing of the past, but the appetites that drew crowds to them continued to be served—by movie palaces, Disneyland, radio, television. Magic turned into "media"; are not our electronic apparitions as ephemeral as images projected on smoke—and as changeable too, suiting their mien to time and place? Our magic industry is following where magicians led.

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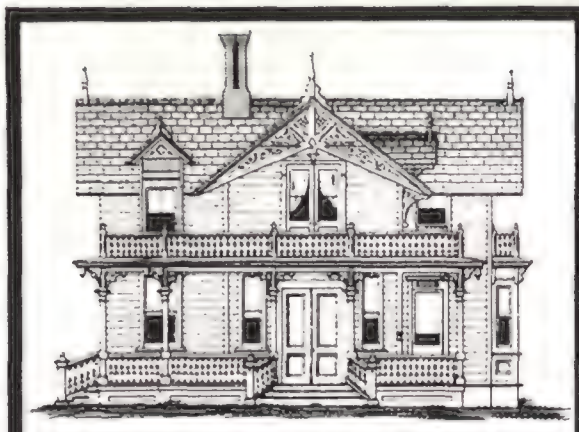

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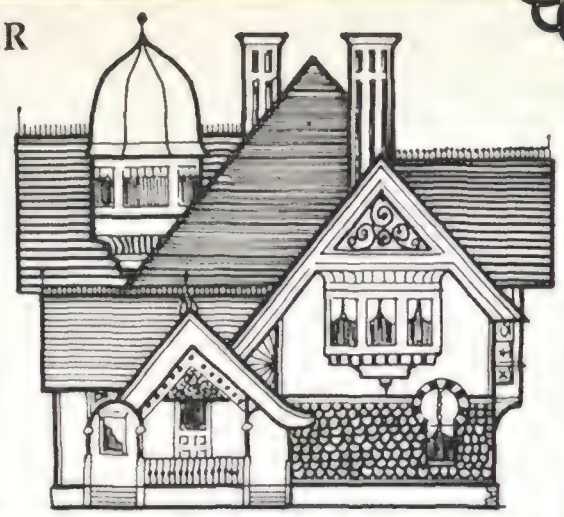

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Book reviews

Thomas Alva Edison: The Biography of a Myth
Wyn Wachhorst
MIT Press, $15

One day in the spring of 1878, a New York reporter visited Thomas Edison and asked, "Aren't you a good deal of a *wizard*, Mr. Edison?" The inventor replied, "Oh, no! I don't believe in that sort of thing." Nonetheless, Edison had been tagged, permanently, as "the Wizard of Menlo Park."

Quite possibly, Edison might have remained to this day simply a great inventor, the indefatigable scientist responsible for the improved telephone, the phonograph, the incandescent lamp and other innovations. But that was not to be. As Wyn Wachhorst makes clear in this thoughtful study of our perception of Edison, the inventor gradually would be transformed over the years into a mythic figure worthy of the American pantheon, right next to Washington and Lincoln.

To understand how Edison the man became Edison the myth, Wachhorst analyzed the vast array of printed materials on the inventor, including 62 books and more than 4,000 articles and reviews, and traced the shifting emphasis on various aspects of his life and character. Much of this biographical information, he found, has consisted of "little more than a series of loosely-joined, often apocryphal anecdotes," based on romanticized accounts of Edison's life. Only recently have biographers, notably Robert Conot in *A Streak of Luck*, revealed Edison as "an introverted, antisocial egomaniac."

In the late 19th century, however, Edison was venerated by Americans as the

modern Prometheus who gave the world light. No longer merely the "wizard" of his most productive years (1876-81) in Menlo Park, New Jersey, he now became a superscientist and a prophet of technological progress. Then, with the discovery by the press in the early 1900s of Edison's raw, folksy personality, came the great shift: "The erudite wizard gave way to the kindly, venerable, and democratic benefactor of mankind."

In analyzing each stage of the evolving Edison image, the author, who teaches

The "wizard" sizes up his phonograph after 60-hour bout perfecting it in 1878.

history at the University of California, Santa Cruz, and at San Jose State University, cites the reoccurrence of certain anecdotes and themes from the inventor's life and work. Thus, for example, in accounts of Edison's childhood, he finds the inventor associated with the American success mythology (as in Horatio Alger's stories, some of which Edison may actually have inspired) and with a typically American, Tom Sawyer boyhood. Here, as elsewhere, the reality was far more mundane. Edison's frequently idealized mother, for instance, often beat him with a birch switch. No matter. By 1911, with the publication of William H. Meadowcroft's *Boys' Life of Edison*, the inventor's pluck-and-luck youth was enshrined in folklore. Indeed, Edison, in each aspect of his life ("from inventiveness and practicality to optimism and the belief in

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progress"), was only "a sharply focused reflection of his time." By well into the 20th century, his "raw, unbounded individualism"—even more than his technological achievements—had catapulted him into the ranks of American culture heroes, where he was viewed as "the embodiment of a Golden Age of youth, hope, and vitality." Even today, says the author, when many aspects of the Edison image are ignored, the inventor's "expansive optimism" and belief that all things are possible remain highly appealing.

Throughout this complex study, Wachhorst draws on the work of others, ranging from novelists John Dos Passos and Kurt Vonnegut jr. to scholars Leo Marx and David Riesman, to illuminate the place of the Edison myth in the American experience. He finds Marx's symbolism of the "Machine in the Garden"—19th-century America's attempt to reconcile the pastoralism of the past with the rise of technology—useful in tracing the societal contradictions embodied by Edison. In him, Wachhorst writes, America found a hero who "balanced the machine and the garden, power and innocence, isolation and communion."

For contemporary Americans, the author suggests that such a hero, encumbered though he may be with contradictory cultural baggage, continues to typify the American spirit, the quest after "the impossible dream" exemplified by immigration, the westward movement and urban migration. Ultimately, Edison has become "the Old Man," who looms out of the past—an "incredibly energetic and affirmative figure."

Joseph Barbato
New York critic and columnist

Martha Washington's Booke of Cookery
With introduction and commentary by Karen Hess
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The Country Housewife and Lady's Director
Richard Bradley
Prospect Books, distributed in United States by University Press of Virginia, $37.50

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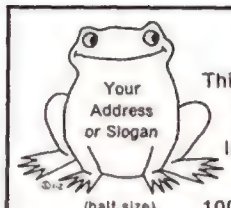

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as home cooking." So writes Karen Hess in an enlightening introduction to this admirable new edition of *Martha Washington's Booke of Cookery*.

Historians, cooks and general readers should celebrate the publication of this extensively annotated volume and of another old cookery book, a facsimile of the 1736 edition of Richard Bradley's *The Country Housewife and Lady's Director*, with introduction and notes by Caroline Davidson. Both are invaluable because of and despite their differences.

The Martha Washington book, an inherited family manuscript that evolved over several generations through accretion, contains recipes that span the Elizabethan and Jacobean periods. The manuscript reached its final state a century before it came into Martha Dandridge's possession in 1749, on the occasion of her marriage to Daniel Parke Custis. Contrary to the implications of its title, it probably never was used as a cookery book in the first First Lady's kitchen, but was viewed rather as a family heirloom. Although it is likely that Martha Washington considered them old-fashioned, many of the recipes in this 17th-century volume form the basis for the elegant cuisine that was developed in the 18th century in the kitchens of wealthy Virginians and for much of what we think of today as American cooking.

The recipes, which were clearly meant for the privileged, in some instances call for lavish amounts of almonds, oranges, wines, butter and cream. Most, however, are well suited to our more recently developed aversion to profligacy, and many sound perfectly delicious. The 17th century was "the golden age of the English kitchen," when previously leaden stews "were largely being replaced by more bracing soups, at least among the wealthy; spices were being used rather more discreetly, except for the ubiquitous nutmeg; the use of fresh herbs was becoming more skilled; and *the sauces were never cheapened with flour*" (emphasis added by Mrs. Hess).

Where recipes are confused or confusing, Mrs. Hess is generous with annotations that are scholarly, informative, opinionated, sometimes intolerant—and delightful. She traces the evolution of and distinguishes between such dishes as fools and trifles and possets and syllabubs.

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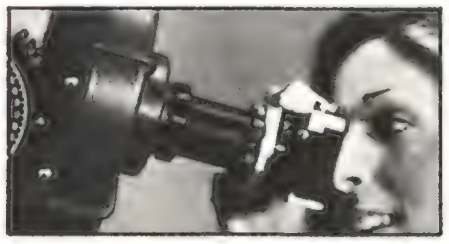

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late the brick oven of the time, and she lists the brand names of flours that approach the quality of those used in the 17th century. She makes sure we understand that the food we eat today is far inferior in taste and quality to that of the 17th century, and because of our own depredations. Nor does she hesitate to point out many of the lessons that the modern cook can learn here, not the least of which is how to make a golden "silken sauce" for a chicken fricassee without, needless to say, the addition of flour.

Bradley's *The Country Housewife and Lady's Director* is remarkable for reasons other than the contributions of its editor, which might have been more generous and included more extensive explanations of 18th-century kitchen terms, more information on individual recipes and a master index that could have encompassed references in her own introduction and glossary and notes.

Published initially in 1727 (our facsimile is of the second, 1736, edition), about a century after the Martha Washington manuscript achieved its final incarnation, it was the first cookery book in England that was written not for the aristocracy but rather for prosperous farmers and their wives who wished to live like aristocrats, but on half the income. Thus, the recipes, in addition to their succinct directions, also inform about the habits of the high and mighty. One recipe for pickling cucumbers points out that "the smallest Size" should be chosen since it is these that are "commonly brought to table among People of the first Rank."

Aside from the knowledge it brings about its time, this is a delightful and lovable book because of the personality of Richard Bradley, its author. Bradley was an original. The first Professor of Botany at Cambridge and a fellow of the Royal Society, his contributions in his own field were distinguished and notable. Moreover, he was a prolific and popular writer on gardening and agriculture who produced at least 25 books within an 18-year period and, according to Davidson, masterminded the translation and publication of five others. Between times he invented the kaleidoscope as a means for arriving at various new geometrical shapes for gardens. He also knew his food.

He got most of his recipes by advertising for them and then arranged them, in Part I of this volume, by months of the year, an innovation for cookery and

household management books. Two recipes from "a Barbadoes lady" introduce cooking with pineapple, while three others enlighten the housewife on various modes of preparing sea turtles. Having traveled extensively collecting plants for patrons and recipes for himself, he includes sauces that keep for the use of those "who too frequently meet with good Fish, and other Meats in Britain, as well as several other parts of Europe, that are spoiled in the dressing." Amen from anyone who has suffered through the offerings of turnpike eateries.

He devotes considerable space to the manufacture of various cheeses, the brewing of beer and ale and the making of wines, all of which were women's work. He particularly addresses the drying and kilning of saffron, which for women was a cash crop, and includes advice on how "To Cure a Lap-Dog, when he continues drowsy some Days, and cannot eat." In addition, he documents English recipes by region, perhaps for the first time, and gives such useful advice as how to choose a good artichoke.

When a subject interests him, he diverges with wit, charm and sense. Thus, a 14-page disquisition on pigeons points out at the beginning the remarkable fact that a "Pigeon has no Gall-Bladder." The culinary reason for this becomes evident ten fascinating pages later, after various species of pigeons and their uses are described. "As to the preparing of Pigeons for the Table . . . the Liver of the Pigeon should be always left in the Body of it. . . . [This] is not known every where, otherwise it would not be so generally taken out and lost, as it is in many places remote from *London*; but this may be, perhaps, because every one does not know that a Pigeon has no Gall."

This is a book to be cherished.

Judith Huxley
Writer of a biweekly food column for
The Washington Post

An Imagined World
June Goodfield
Harper & Row, $12.95

Reading *An Imagined World* takes me back to those formative hours spent with Paul de Kruif's scientific biographies: *Microbe Hunters, Hunger Fighters* and *Men Against Death*. Rockefeller Institute (now University) provided for de Kruif's scientific maturation and is now home base for scientific historian and author June Goodfield. The style, the vigor and the sense of scientific adventure that the earlier writer brought to his work are all here, again creating a cliff-hanger of a story as we wonder: Will Anna Brito succeed in understanding the relation between iron metabolism and certain malignant and infectious processes? ("Anna Brito" is the pseudonym for a scientist now active in biomedical research.)

But the purpose of this work is more serious than just telling a story; the author wants a wider public to know about the process of creating science and the people who carry out that enterprise. The book is very much a collaboration between scientist Brito and author Goodfield, a five-year effort combining friendship and an attempt to present an honest picture of research. Certainly the flaws are not concealed: unfunded grants, rejected papers, doubting colleagues, the unceasing pain of self-doubt.

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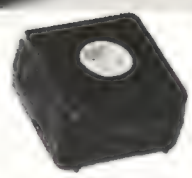

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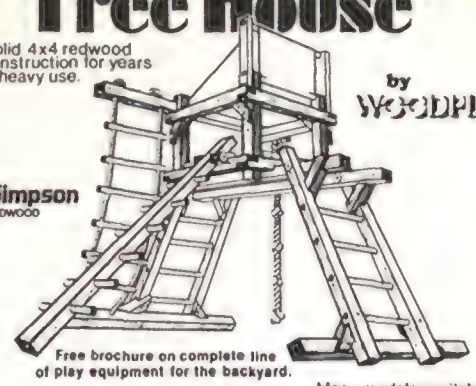

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The joint enterprise of scientist and historian has succeeded well in giving a realistic view and conveying to the reader the sounds and sights of the laboratory as well as a feeling of what must go on in the mind of a dynamic biological researcher struggling with novel concepts.

Why then does this biography leave one feeling somewhat uncomfortable? In the attempt to be absolutely open, *An Imagined World* presents more psychological information about a contemporary than I feel I have the right or desire to know. The curtain is parted and the reader has a sense of being a voyeur, learning things that should only be revealed to friends or in some cases only to the self. The intimate details are not about some dim figure out of the past, but about a colleague whom I could identify if I were in the same field. I might meet her near an instrument exhibit at the federation meetings. What does one say to a fellow scientist whose heart and soul have also been exhibited in public?

And to make matters more sensitive, having looked behind the curtain I don't like some of the things I see. While purporting to be a book about science, this is curiously a book stressing women's science (de Kruif, of course, wrote about men's science). Most of the chief characters and all of the interesting ones are women. Dr. Brito tells about reading Anne Sayre's book about Rosalind Franklin. Perusing this biography one would hardly guess that there are many men of sensitivity in modern research. (Is that Brito or Goodfield?) In addition, discovery is "virgin," feelings are "vaginal," and the two main male characters, postdoctoral fellows, are referred to by Dr. Brito as "the boys," "a marvelous boy," and "a golden boy." Strong if subtle feminist views weave in and among the tubes of lymphocytes, pipettes of antisera and bottles of reduced iron.

A second unsettling motif that emerges is Anna's self-conscious concern with the creative process within. The strength to survive the ego assaults suffered by creative scientists certainly requires a very strong sense of self. Usually these feelings are hidden from colleagues as being somewhat asocial. *An Imagined World* is, as we have noted, an honest book, sometimes painfully so.

Harold J. Morowitz
Author and professor of biophysics and biochemistry at Yale University

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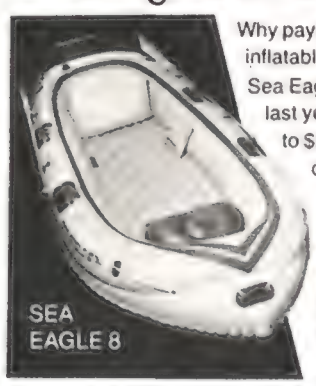

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Additional reading

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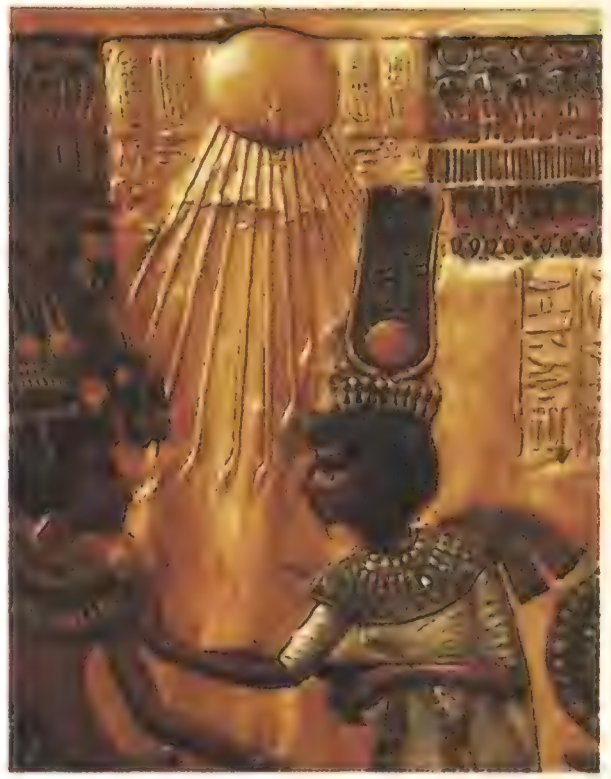

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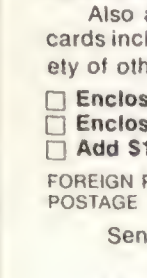

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Chinese garden court (p. 66)

A Chinese Garden Court: The Astor Court at The Metropolitan Museum of Art by Alfreda Murck and Wen Fong, The Metropolitan Museum of Art Bulletin, Winter 1980/81

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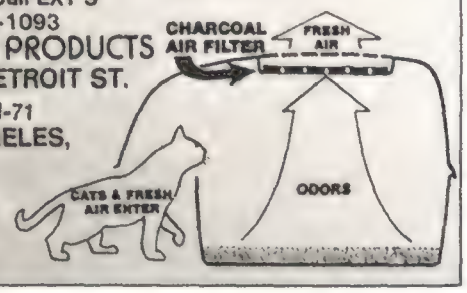

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Smithsonian highlights

At the NMAH: July 4th festivities

Big parties on the Mall this month. There's the July 4th celebration, the Air and Space Museum's fifth anniversary, and the Folklife Festival on the Washington Monument grounds (SMITHSONIAN, June 1981). For the nation's affair, July 2-5 at the National Museum of American History (NMAH), a variety of traditional events are scheduled, including free puppet and mime shows, concerts, parades, the reading of the Declaration of Independence, family games and races and a look at how you make ice cream and baseball bats.

Down the road at NASM, there's a July 1-5 celebration with model-plane workshops, a Frisbee demonstration, concerts and a full calendar of activities. The celebration will be launched by a public birthday party, 9 P.M. to midnight, July 1.

Special July events

National Air and Space Museum
Fifth Anniversary Celebration (July 1-5) Free activities, see above.
Jet Aviation New exhibit traces evolution of commercial and military jets.
Reflections on Apollo (July 4, 9 A.M.) Monthly sky lecture looks at the moon.

National Museum of American History
July 4th Celebration (July 2-5, noon to 5 P.M.) A variety of events, see above.
The Commodores (July 1, 6 P.M., Mall Terrace) U.S. Navy jazz concert.
Perfect in Her Place (July 21-January 24) Women at work in the 19th century.
Images of Labor (July 16-August 26) Contemporary artwork based on issues and history of American labor movement.

Hirshhorn Museum & Sculpture Garden
Larry Rivers: HM&SG Collection (July 16-September 20) Forty-three works reflect artist's virtuosity, wit.
Kenneth Snelson (through August 9) Twenty-year retrospective.

Freer Gallery of Art
Korean Art (July 15-September 15) Ceramics, paintings and metalwork.
Art of the Mamluks Heritage of Egypt and Syria, 13th-16th centuries (p. 108).
Eastern Kufic Calligraphy Koran pages.

Cooper-Hewitt Museum (New York)
The Moving Image (through August 16) Artwork for animation films (right).
Gardens of Delight (through August 23) Horticulture and its reflections in art.

National Museum of Natural History
5,000 Years of Korean Art (July 15-September 30) Major exhibit includes some 350 objects—gold crowns, sculptures and celadons (SMITHSONIAN, May 1979).
Renaissance of Islam: Art of the Mamluks (ends July 19) Art, artifacts of these impressive bodyguards-turned-rulers (p. 108).
Galápagos: Born of the Sea (through August 2) Photos of exotic underwater life.

National Portrait Gallery
Champions of American Sport (through September 7) See p. 145.
Charles Willson Peale as Printmaker (July 24-January 3) Some 12 works.
We Never Sleep (July 31-January 3) Mid-19th-century bankrobbers, outlaws and pickpockets appear in this exhibition on Allan Pinkerton and the early years of his detective agency.

National Museum of American Art
George Catlin: The Artist and the American Indian (through September 13).
New Accessions (through November 1) Some 20 paintings and sculptures.

Smithsonian events

For tickets to July Resident Associate Program events, call 357-3030:
An Evening with Larry Rivers (July 16, 8 P.M.) American artist on his work.
Front Royal Weekend: Sociobiology of Birds (July 10-12) Indoor-outdoor learning at this Blue Ridge Mountain center.
George Catlin: The Artist and His Work (July 14, 8 P.M.) Illustrated lecture.
Galápagos—Almost Eden (July 20, 6 and 8 P.M.) A photographic exploration.

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Albuquerque (July 18-August 30) *From All Walks of Life: Paintings of the Figure From the National Academy of Design,* Museum of Albuquerque.

Camden, New Jersey (July 4-August 2) *Know What You See: The Examination and Treatment of Paintings,* Stedman Art Gallery, Rutgers University.

Jamestown, New York (July 4-August 2) *Children's Art From the People's Republic of China.*

Chadds Ford, Pennsylvania (July 11-August 9) *Birds of Prey: Paintings by Louis Agassiz Fuertes,* Brandywine River Museum.

Wichita Falls, Texas (July 25-August 23) *The Great West, Real/Ideal,* Wichita Falls Museum and Art Center.

Seattle (July 4-September 27) *What If You Couldn't. . . ? An Exhibition About Special Needs,* Pacific Science Center.

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NPG's lineup of champions

Running back O. J. Simpson was caught on canvas by Andy Warhol.

"Most Valuable Player" Willis Reed, by Joe Wilder, joins NPG team.

Visitors to the current exhibition at the National Portrait Gallery may wonder if they should stand back and admire the art or put their fingers to their mouths, whistle and shout "Kill the umpire!" Peering down from the museum walls are such greats as Joe Louis, Babe Ruth, Jesse Owens and 97 other athletes whose portraits, photos and memorabilia are part of a major exhibition, *Champions of American Sport.*

"Honoring sports heroes, that was easy. But choosing them was difficult, not because there are so few but because there are so many—some favorites are bound to be missing," said NPG historian Marc Pachter who, along with curators Beverly Cox and Ken Yellis, chose the lineup. "We looked for athletes with charisma, why generations of Americans couldn't take their eyes off them . . . the way Namath would run or DiMaggio would swing or why when Willie Mays was out there, everybody felt happy." The result is a unique blend of sports and art, with works by Thomas Eakins, Norman Rockwell, Elaine de Kooning, N.C. Wyeth, Frederic Remington and others. The show closes September 7, then travels to Chicago, Los Angeles and New York.

Champions of American Sport goes back to the 1830s, when Americans began to turn from the more traditional and personal sports such as hunting and fishing to the exciting, gregarious pastime of cheering on their favorites—together. Hiram Woodruff, who raced trotters, walker Edward Payson Weston and figure skater Jackson Haines became famous. In the 1880s, fans went crazy over bare-knuckles boxer John L. Sullivan and baseball's Mike "King" Kelly. Others among the NPG athletes are baseball and football players, swimmers, jockeys, skaters, hockey and track stars, as well as those from the quieter worlds of golf, tennis and yachting. Other standouts: the 1938 Maserati that won the Indianapolis 500, Muhammad Ali's robe, Johnny Weissmuller's swimming medals and a swell collection of baseball cards. In short, a real sports extravaganza except, perhaps, for popcorn in the halls.

Carol Simons

Willie Shoemaker on Spectacular Bid is a 1980 work by Richard Stone Reeves.

It's probably a homer for Babe Ruth in a portrait by Paul L. Clemens.

Miguel Covarrubias caricatured Helen Wills, reigning tennis queen of the 1920s.

Betsy Graves Reyneau did 1946 oil of heavyweight Joe Louis.

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Desolation and Gray Canyons July 22-August 1, September 30-October 11, or October 12-23. White-water trip for the adventurous; explore the geology, wildlife and exciting Indian and outlaw history of Utah's Green River.

Grand Canyon August 14-24 or August 22-September 1: The light and shadow of a sublime natural spectacle, seen on a raft trip down the Colorado River.

The North Woods August 20-28: Minnesota's lakes, streams and forests are the setting for a hiking and canoeing natural history program.

Hopi and Pueblo Country September 12-22: Enjoy autumn colors and study Southwest Indian cultures with visits to Mesa Verde, Chaco Canyon, Hopi Reservation and Canyon de Chelly.

San Francisco September 20-26: An in-depth view of the city's social and architectural history. Museum visits, bay cruise, evening events and concerts.

California Wine October 4-10: Visit selected vineyards for tasting and lectures with distinguished wine masters.

Great Smoky Mountains October 9-15: Camping, hiking and brilliant autumn colors enhance this spectacular natural history study adventure.

Asheville October 15-18: Visit Biltmore and other historic homes in this mountain resort area during the peak of fall foliage.

Gems Weekend October 16-18: The science and romance of gems and minerals with behind-the-scenes tours of the Smithsonian's renowned, glittering collections.

Florida Keys October 19-25: An active program of snorkeling, canoeing and swimming to study the ecology of Big Pine Key and colorful coral reefs.

Sapelo Island November 8-14: Camp on unblemished beaches while studying the marine ecology, Indian ruins and history of this Georgia barrier island.

Washington "Anytime" Weekend Choose any weekend to visit your choice of Smithsonian museums, spend two nights at Loew's L'Enfant Plaza Hotel or Hyatt Regency Washington, each close to the Mall, and see other sights in the city by Tourmobile. Reservations and payments at least ten days prior to arrival.

Foreign Study Tours

These tours range in size from small group experiences to charter adventures and vary in price from low cost to deluxe, depending on the type of travel, destination visited and length of trip:

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Oxford/Smithsonian Seminar September 11-26: Oriental Ceramics and Anglo-Saxon Art are among ten in-depth courses taught by Oxford faculty. Live in Worcester College and visit Cambridge, Bath and Stratford for a performance.

The Ancient World of Peru September 18-October 2: Visit Lima and major archaeological sites along the coast; then explore the Inca capital of Cuzco, amazing Machu Picchu and colorful Indian markets.

Canadian Rockies September 22-30 Snow-capped peaks, lakes and forested valleys provide scenic grandeur for hiking and natural history study at Banff, Lake Louise and Jasper.

Salzburg Seminar October 3-18: Live in the 18th-century lakeside palace of Schloss Leopoldskron while studying the Baroque Era or the history of opera. German lessons, museum visits, theater and concerts enhance plenary lectures in this magnificent setting.

Portugal October 6-20: Explore Lisbon's fine museum and art collections before traveling to Alto Alentejo or Old Lusitania to see fortified hilltop cities, isolated castle towns, cathedrals and monasteries.

Kyoto Seminar November 6-22: A unique program to study Japanese culture and live in Japanese style. Scholars conduct seminars in art, history and introductory language lessons and lead field trips to the great temples, shrines and lovely gardens of Kyoto and Nara.

India Wildlife Safari November 16-December 11: Visit major wildlife sanctuaries to observe the magnificent animal life of the subcontinent. Travel to parks in Northern and Central India and Nepal's famous Tiger Tops.

Baroque Winter: Vienna, Salzburg, Munich January 3-17: The splendors of Central Europe in the new year with walking tours, museum lectures, opera and concerts in Vienna, Mozart's Salzburg, and the Bavarian capital. A special Smithsonian Viennese Ball is included.

Panama and the Spanish Main January 9-16: Experience the thrill of traveling from the Pacific to the Atlantic through the Panama Canal. Continue to the fascinating San Blas islands, then the Spanish Main bastion of Cartagena. Our chartered ship *Jason* also calls at Curaçao in the Dutch Antilles, the beautiful spice island of Grenada, and Barbados.

Mayan Mexico: The Yucatán Peninsula January 21-February 2 or February 10-22: The extraordinary ruins of the Yucatán in the company of an archaeologist—Uxmal, Palenque, Labná, Sayil, Kohunlich, Cobá, Tulum and Chichén Itzá.

Tall Ship Adventure February 12-21: Set sail on the luxurious 317-foot, four-masted sailing yacht *Sea Cloud* from Antigua to the Grenadines. Lectures and excursions enhance this fabulous sailing experience in the Caribbean.

Kenya January 28-February 14: Incomparable wildlife is observed in old safari tradition. Seminars in Nairobi, and in the field at Masai Mara, Samburu, Kilaguni. Visit a school and meet local people.

Red Sea Passage February 25-March 7: Sail from Suez on the *Argonaut*, visit Karnak, Luxor, Valley of the Kings, Abu Simbel in Egypt and Petra in Jordan. Tour the mosques and bazaars of Cairo, the Sphinx and pyramids at Giza. Optional Jerusalem prelude—February 18-26.

Write National Associates, A&I 1278 Smithsonian Institution, Washington, D.C. 20560 or call (202) 357-2477 for specific tour brochures

in Washington

Selected Studies Seminars

Now is the time to enjoy the latest popular programs at the Smithsonian which combine excellent speakers and behind-the-scenes tours. Choose from:

Chinese Ceramics September 20-25: Connoisseurship of the timeless beauty and outstanding craftsmanship of famous masterpieces. Highlights exquisite export wares, enameled porcelains, recent discoveries, dating controversies, detection of fakes and the market today, as well as tours of renowned collections.

Genealogical Research September 27-October 2: Taught by Milton Rubincam, Marilyn Duncan and other leading authorities, participants learn how to conduct research in major genealogical repositories such as the National Archives, Library of Congress and DAR Library.

American Antique Furniture September 20-25: Connoisseurship of masterpieces, 1650-1840. Includes great collections, detection of fakes, care of antiques and tours of the elegant Diplomatic Reception Rooms at the Department of State and of Winterthur Museum.

Aircraft Restoration: How To October 4-8: The master craftsmen of the National Air and Space Museum share their many techniques in workshops at the Paul E. Garber Facility (formerly Silver Hill).

Tibet: Lost Horizons October 18-23: The culture, history and art of this rich civilization along with behind-the-scenes tours of the Freer Gallery and the best private collection in the United States.

Post-Impressionist Masters October 25-30: Bill Kloss explores the outstanding paintings of artists such as Gauguin, van Gogh and Cézanne in lavishly illustrated lectures and tours of great museums.

Historic House Preservation November 1-6: Cosponsored with the Historic House Association of America, nationally known experts advise on all aspects of restoration and tour successful projects from lovely town houses to country estates.

World War II Aviation November 15-20: NASM's outstanding aeronautical staff and guest experts offer new insights into how the world's major air forces developed, and how quantum jumps in performance were achieved. Includes tours of many of the only surviving planes.

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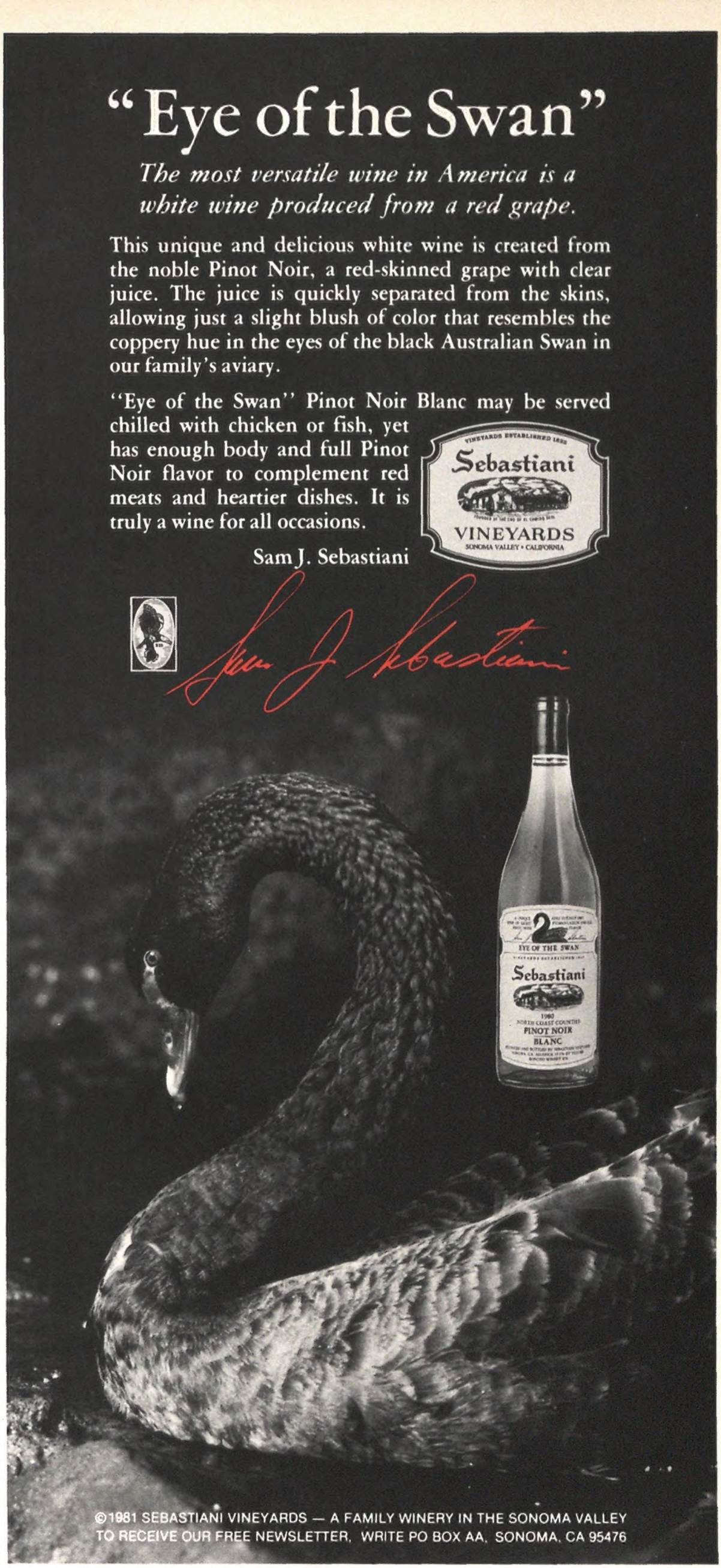

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By Philip Smith

In pursuit of dream pipes and some pipe dreams

A pipe, says my friend Arnold, gives a man time to "dink."

"When the vife yells, you have time for dinking," the 76-year-old tobacconist told me one day in his rich German accent. "First you have to remove the pipe from your mouth. Then you have to blow out the smoke. In this time, you dink of an answer, you see."

I tapped my Comoy on the counter and began to dink about my own pipe-smoking habits for the first time in 20 years. Back at the office I rummaged through my pipe drawer—18, 19 . . . there were 43. "Good God!" said a nonsmoking colleague. "Why don't you get rid of a few?"

Sell my stereo, yes; give up vacations, maybe. But dump the Dunhills, the Savinellis, the GBDs? I began to wonder if I owned too many. True, I can't go anywhere without a pipe, and often two or three. I stuff them in my clothes, stash them in the glove compartment, hide them in my wife's purse at dinner parties. She told me that when I patted my suit during our wedding ceremony, she didn't know whether I was looking for the ring or a pipe cleaner.

Was mine the worst case of pipe mania I'd ever find? I decided to check around.

"I haven't had a pipe out of my mouth in 25 years," said the *New York Times'* Myron Farber when I reached him in an Atlanta hotel. Farber spent some time in jail for contempt of court a few years ago after he refused to surrender his notes in a celebrated New Jersey murder trial. "If they wanted the damned notes," he said, "all they had to do was put me in a nonsmoking cell."

I caught Senator John Warner, the Virginia Republican, on a slow Friday afternoon. "Well, my wife [actress Elizabeth Taylor] doesn't like me to smoke in the house. I respect that," he said. "I also don't smoke two days a week. Resuscitates the oral cavity." How many pipes does he own? "About 50."

Arnold had said it's a sad thing to see a man who has lost a pipe. "They lose a pipe, it's like they lose a hand," he said. "We get tears. This is unbelievableness."

A retired Army paratrooper told me he had smoked a pipe whenever he went up for a jump. It soothed him before the drop. Just before he jumped, he'd stick the pipe in his boot. Most of the time when he hit the ground, the pipe was gone. He never found a solution, but he never gave up his pipes, either.

What about packing a pipe wherever you go?

"I carry three in my briefcase on assignments," said Farber. "I keep six on my desk, and I have 15 or 20 backups." Warner agreed. "I tend to buy smaller pipes now. That way I can stick them in my vest," he said. "Of course, it's pure hell on your pockets." Warner has been known to send word from a committee hearing that he's left his briefcase somewhere and he's pipeless. A secretary packs a bowl with tobacco and hustles it over. An aide said Warner likes his staff to line up at least one antique shop that he can visit on every political swing through Virginia. Does this penchant for old pipes inconvenience the staff? "He loves his pipes," said the aide.

"Look, a pipe is a very, very personal thing," said Bill Martin, a Washington, D.C., tobacconist. It's one reason aficionados buy so many, always looking for the perfect one. Some are beautiful from the beginning; others start out wrong and are always wrong.

"I was sitting in a restaurant in Manhattan having dinner with my brother," Farber said, "when I saw a man two tables away take out a Dunhill with an unusually large bowl." Intrigued, Farber introduced himself and they chatted until Farber's brother had to leave. As soon as the brother disappeared, Farber dashed back inside to continue the talk. The Dunhill owner was gone.

Outside, Farber drove down the street, until he spotted the man on the sidewalk. "He was an IRS agent from Philadelphia, and staying in a hotel on the West side of New York," Farber recalled. Farber was invited back to the room, where the agent produced several more Dunhills.

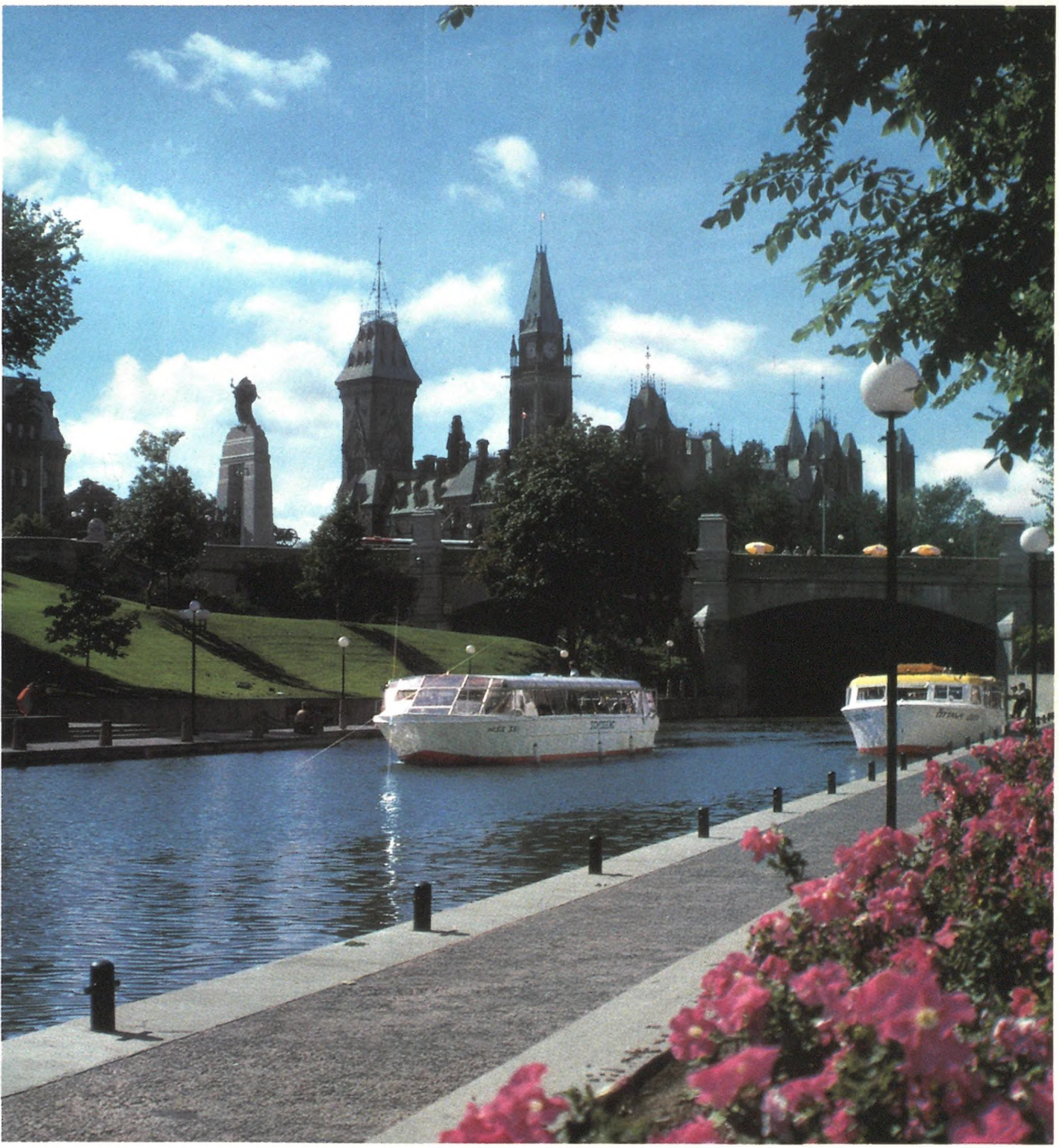
"But I have better pipes," the agent said. He brought out a batch that had been handmade by a craftsman in a town in southern New Jersey.

A day or two later, Farber and his wife climbed into the car and sped south from New York. They found the pipe maker hunched over his workbench, surrounded by rows of his handiwork. The pipes were exquisite and the price more than reasonable. Farber bought. "I've never had a better one," he said in a satisfied voice.

That's what it's all about, I concluded. The pleasant smoke, the quality workmanship, the fraternity of men, as Arnold said, giving themselves time to dink. I closed my desk drawer, determined to leave it as it was.

The next morning at breakfast, my wife announced she was quitting cigarettes. For pipes.

"capital sights"



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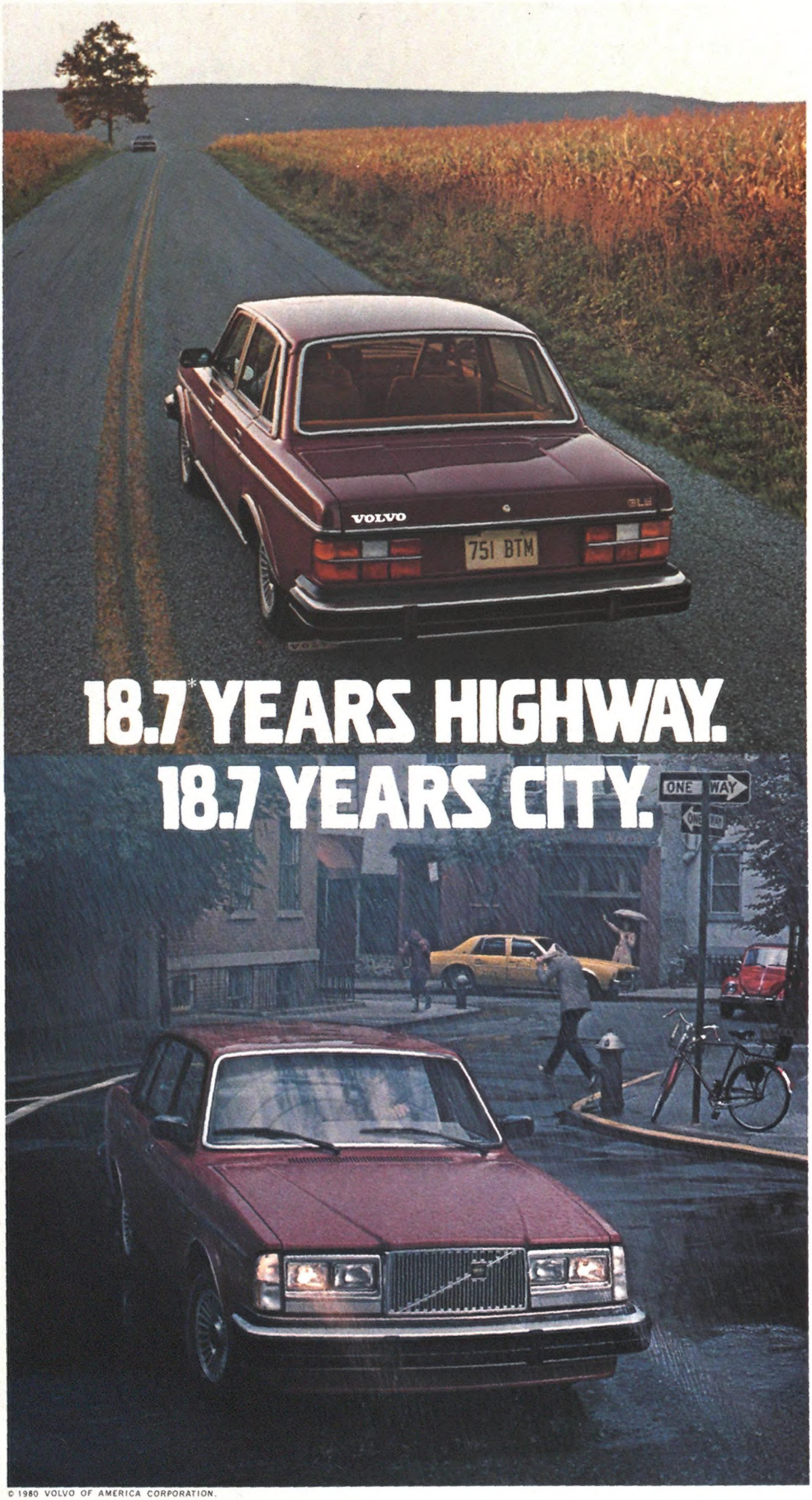

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